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Limnological Monitoring on the Upper Mississippi River System, 1993–1996: Long Term Resource Monitoring Program Pool 26 Field Station

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by

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October 2002

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Preface

The Long Term Resource Monitoring Program (LTRMP) was authorized under the Water Resources Development Act of 1986 (Public Law 99-662) as an element of the U.S. Army Corps of Engineers' Environmental Management Program. The LTRMP is being implemented by the Upper Midwest Environmental Sciences Center, a U.S. Geological Survey science center, in cooperation with the five Upper Mississippi River System (UMRS) States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The U.S. Army Corps of Engineers provides guidance and has overall Program responsibility. The mode of operation and respective roles of the agencies are outlined in a 1988 Memorandum of Agreement.

The UMRS encompasses the commercially navigable reaches of the Upper Mississippi River, as well as the Illinois River and navigable portions of the Kaskaskia, Black, St. Croix, and Minnesota Rivers. Congress has declared the UMRS to be both a nationally significant ecosystem and a nationally significant commercial navigation system. The mission of the LTRMP is to provide decision makers with information for maintaining the UMRS as a sustainable large river ecosystem given its multiple-use character. The long-term goals of the Program are to understand the system, determine resource trends and effects, develop management alternatives, manage information, and develop useful products.

In this report, limnological monitoring conducted by the Pool 26 Field Station from 1993 through 1996 is summarized. Reports of this type provide a synopsis of the collected data and collection methods, as well as a preliminary report of remarkable or unusual conditions in the system. They are intended to be produced annually.

This report was prepared under Task 2.2.3.6, *Evaluate and Summarize Current Monitoring Results* of the Operating Plan (U.S. Fish and Wildlife Service 1993). This report was developed with funding provided by the Long Term Resource Monitoring Program.

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Abstract: Since 1988, the Long Term Resource Monitoring Program (LTRMP) staff have performed basic limnological field measurements in the Upper Mississippi River System. The period of this report (1993–96) includes a major revision of the LTRMP sampling design in 1993 that added randomization, broader spatial coverage, and increased monitoring of tributaries and locations that allow monitoring of material transport. The 1993–96 water quality data for the Pool 26 area show long-term declines in the concentrations of total nitrogen, nitrate–nitrite nitrogen, and soluble reactive phosphorus after the large flood in 1993. The data also indicate that contiguous backwaters have unique water quality among the sampling strata, characterized by higher turbidity, volatile suspended solids, and fluorometric chlorophyll *a*, and lower total nitrogen and nitrate–nitrite nitrogen.

The Missouri and Illinois Rivers significantly alter the Mississippi River main stem in the Pool 26 study area. The Missouri River contributes high turbidity, silicate silica, and total suspended solids, whereas the Illinois River contributes elevated concentrations of total nitrogen, nitrate, total phosphorus, and soluble reactive phosphorus. Dissolved oxygen concentrations (>5 mg/L) were good in the Mississippi River main stem but were somewhat lower in the Missouri and Illinois Rivers. In the Illinois River, concentrations fell to or below the Illinois general use water quality standard of 5 mg/L every summer during 1993–96.

Key words: Annual report, limnology, LTRMP, Mississippi River, water quality

Introduction

The Upper Mississippi River is a major resource of multiple uses that include navigation, water supply, hydroelectric generation, fish and wildlife habitat, and recreation. Effective management of this resource requires scientific understanding of the ecosystem and of its long-term trends and conditions. To meet this need, Congress authorized a Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System (UMRS). The LTRMP, begun in 1988, is intended to provide scientifically sound and useful information by using consistent and reliable methods to monitor and evaluate long-term changes in selected physical, chemical, and biological characteristics.

The LTRMP water quality staff collects basic information on selected physical and chemical features of the UMRS to aid in the interpretation or prediction of long- and short-term patterns. The data focus on a subset of limnological variables (i.e., physicochemical features, suspended sediment, and major plant nutrients) known to be significant to aquatic habitat in this system. The LTRMP is designed to complement, not replace or duplicate, the monitoring programs of other state and Federal agencies. It therefore includes some limnological characteristics not routinely monitored in water quality programs and it excludes others

that are of concern primarily for human consumption or regulatory purposes (e.g., chemical oxygen demand, biochemical oxygen demand, total coliform bacteria, fecal coliform bacteria, fecal streptococcus, heavy metals, pesticides, and polychlorinated biphenyls).

The present report is one in a series summarizing limnological monitoring at each of the LTRMP field stations. This report is intended to (1) document those aspects of sample collection (e.g., sampling times, period of record, sample locations, and allocations among strata) needed for valid interpretation of the data, and (2) report limnological conditions. Detailed analyses and interpretation of the limnological data are reported separately. This report, the first of this specific series, covers multiple years.

To improve readability and increase the usefulness of this document as a reference, the numerous graphic and tabular summaries are included as appendixes. These appendixes are referenced extensively in the main body of the report, and each appendix contains explanatory information that allows it to be used as a nearly independent document.

The data presented here represent a concerted effort by personnel of the Illinois Department of Natural Resources and the U.S. Geological Survey who collected, compiled, verified, and organized the data. The specific data used in this report have been archived at the Upper Midwest Environmental Sciences Center (UMESC), La Crosse, Wisconsin (formerly the Environmental Management Technical Center, Onalaska, Wisconsin), and are available on request. This archival step isolates these data from the dynamics (additions and corrections) of the main LTRMP database and thus facilitates the reexamination, reconstruction, or expansion of the results presented here.

The Upper Mississippi River System

The basin of the UMRS (about 490,000 km^2) extends from north-central Minnesota to the Ohio River confluence near Cairo, Illinois. The enabling authorization for the LTRMP, however, restricts monitoring to the geological floodplain (about 2% of the total drainage). The LTRMP study areas include selected sections of the Mississippi River (Navigation Pools 4, 8, 13, and 26), La Grange Pool of the Illinois River, and the open river reach (Middle Mississippi River) between the Missouri River and Ohio River confluences (Figure 1).

Field teams of the LTRMP monitor more than 2,000 km of large river; across this expanse there exist distinct differences in climate, geomorphology, surficial geology, and land use. Patterns that arise from the north–south orientation of the system are overlain by upstream to downstream changes related to river size (Vannote et al. 1980). Consequently, the areas monitored by individual field stations differ markedly in the distribution and characteristics of aquatic habitat and aquatic biota. The LTRMP monitoring design must contend with these differences by being flexible enough to accommodate local conditions but appropriately uniform across all study areas to permit comparison and synthesis.

Dam construction on the Upper Mississippi and Illinois Rivers has profoundly altered these rivers, creating a series of rapidly flushed impoundments connected by short stretches of flowing river that are influenced by dam operations (Figure 2).

Figure 1. The Long Term Resource Monitoring Program (LTRMP) study area. Although the Missouri River is shown for reference, only the mouth of this tributary is sampled for water quality under the LTRMP.

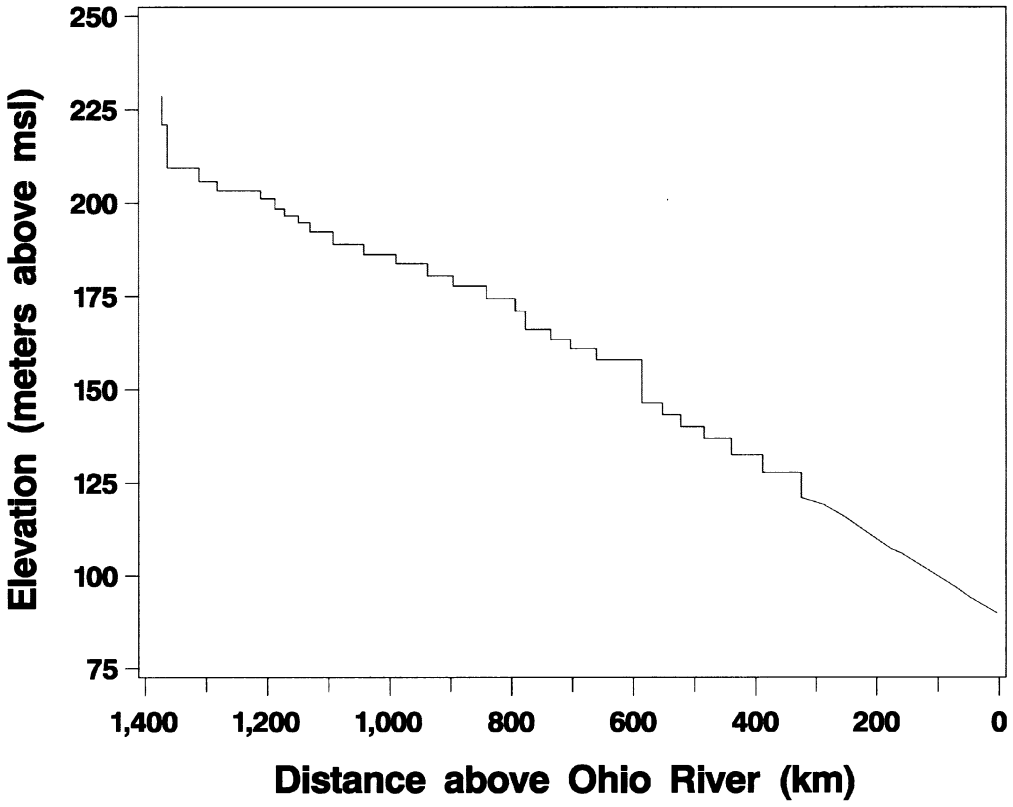

Figure 2. Water surface elevation (meters above mean sea level) of the Mississippi River from the head of navigation near St. Paul, Minnesota, to the confluence of the Ohio River near Cairo, Illinois.

The dams on the main stem of the Upper Mississippi River are numbered from upstream to downstream (starting near St. Paul, Minnesota), and the river reach above each dam is called a pool (Table 1a). The pool has the same numeric designation as the downstream dam. For example, Pool 14, near Clinton, Iowa, includes the entire reach of river upstream of Lock and Dam 14 and downstream of Lock and Dam 13. A similar system is used on the Illinois River, but the individual dams are named rather than numbered (Table 1b). Although the navigation dams have created significant zones of permanent inundation in Pools 1–13 of the Upper Mississippi River, these zones are usually less than half the total water surface within the pool (LTRMP aquatic areas database) and are semifluvial (average hydraulic residence times <2 days). Between Pools 13 and 26 in the Mississippi River and in most of the Illinois River, the navigation dams have deepened the river and widened it slightly, but have permanently inundated little terrestrial area compared with major river impoundments and have created minimal lake-like habitat. The term pool is therefore misleading inasmuch as it suggests that the UMRS is a stair-step series of lake-like impoundments. Nonetheless, the term is widely used and recognized by those familiar with the UMRS and it is used freely in this report.

The first major dam on the Upper Mississippi River was constructed in 1913 near Keokuk, Iowa, and was followed by 27 additional dams on the main stem to create a 2.7-m (9-foot) navigational waterway from Alton, Illinois, to St. Anthony Falls near St. Paul, Minnesota. Twenty-two dams were built between 1935 and 1940; the last dam was completed in 1958 at Lower St. Anthony Falls near Minneapolis (Table 1a). The

navigation system was altered significantly in 1993 when Lock and Dam 26 at Alton was replaced by a new structure (Melvin Price Locks and Dam) with increased lock capacity about 3.2 km (2 miles) farther downstream. The previous Lock and Dam 26 was removed after the new structure was completed.

The history of impoundment on the Illinois River is similar to that of the Upper Mississippi River, and the Illinois River is now divided into six navigational pools (Table 1b). The first dams were completed on the upper portions of the Illinois River (Starved Rock, Marseilles, and Dresden Island) in 1933; additional dams at Peoria and La Grange were completed in 1938. The Melvin Price Locks and Dam on the Mississippi River near Alton, Illinois, also impounds the lowermost portion of the Illinois River.

Table 1a. Dams on the Upper Mississippi River.

Name of dam	Date placed in service	City	River mile	Drainage area (km^2)	Dam height (m)	Pool elevation (feet)
Lower St. Anthony Falls	11/13/1958	Minneapolis, Minnesota	853.2	51,000	7.3	750.0
1	07/03/1917	St. Paul, Minnesota	847.6	51,000	11.3	725.1
2	07/01/1931	Hastings, Minnesota	815.2	96,000	3.7	687.2
3	07/21/1938	Red Wing, Minnesota	796.9	117,000	3.7	675.0
4	05/25/1935	Alma, Wisconsin	752.8	148,000	2.4	667.0
5	05/29/1935	Minneiska, Minnesota	738.1	152,000	2.1	660.0
5a	07/06/1936	Winona, Minnesota	728.5	153,000	2.7	651.0
6	06/30/1936	Trempealeau, Wisconsin	714.3	155,000	1.7	645.0
7	04/19/1937	Dresbach, Minnesota	702.5	161,000	2.0	639.0
8	04/26/1937	Genoa, Wisconsin	679.2	168,000	2.4	631.0
9	07/08/1937	Lynxville, Wisconsin	647.9	172,000	3.4	620.0
10	11/26/1937	Guttenberg, Iowa	615.1	206,000	2.7	611.0
11	09/14/1937	Dubuque, Iowa	583.0	211,000	2.4	603.0
12	05/14/1939	Bellevue, Iowa	556.7	213,000	3.4	592.0
13	05/13/1939	Clinton, Iowa	522.5	221,000	2.7	583.0
14	06/14/1939	Le Claire, Iowa	493.3	229,000	3.3	571.9
15	03/07/1934	Rock Island, Illinois	482.9	229,000	4.9	561.0
16	07/10/1937	Muscatine, Iowa	457.2	257,000	2.7	545.0
17	05/14/1939	New Boston, Illinois	437.1	258,000	2.4	536.0
18	09/08/1937	Burlington, Iowa	410.5	294,000	3.0	528.0
19	06/12/1913	Keokuk, Iowa	364.2	308,000	11.6	518.2
20	06/09/1936	Canton, Missouri	343.2	348,000	3.0	480.4
21	07/21/1938	Quincy, Illinois	324.9	348,000	3.2	470.0
22	07/22/1938	Saverton, Missouri	301.2	356,000	3.1	459.5
23[a]	—	—	—	—	—	—
24	1940	Clarksville, Missouri	273.4	365,000	4.6	449.2
25	05/18/1939	Cap Au Gris, Missouri	241.4	368,000	4.6	434.9
26[b]	05/01/1938	Alton, Illinois	202.9	443,000	6.7	419.0
Melvin Price	1990–1994	Alton, Illinois	200.8	444,000	7.3	419.0

[a]Lock and Dam 23 was never built.
[b]Lock and Dam 26 was removed after the Melvin Price Locks and Dam was placed in service.

Table 1b. Dams on the Illinois River.

Name of dam	Date placed in service	River mile	Drainage area (km^2)	Dam height (m)	Pool elevation (feet)
Thomas J. O'Brien[a]	1960	326.5	0	1.2	583.5
Lockport	1933	291.1	1,900	12.3	579.5
Brandon Road	1933	286.0	3,900	10.4	539.0
Dresden Island	1933	271.5	18,800	6.7	505.0
Marseilles	1933	247.0	21,400	7.3	483.0
Starved Rock	1933	231.0	28,600	5.8	459.0
Peoria	1938	157.7	37,700	3.4	440.0
La Grange	1939	80.2	66,400	2.9	429.0

[a]This structure controls diversion discharge into the Illinois waterway from outside the drainage basin (Lake Michigan)

Methods

Study Area

The study area of the LTRMP includes the Mississippi River from Cairo, Illinois, to the head of navigation near St. Paul, Minnesota; the Illinois River; and navigable portions of the Kaskaskia, Black, and St. Croix Rivers. In recognition of the highly variable and widely differing river characteristics within this large study area, the Comprehensive Master Plan (Jackson et al. 1981) recommended 17 pools or reaches for detailed monitoring. Available resources, however, have limited the LTRMP to six selected areas, and the five states bordering the Upper Mississippi River now operate six LTRMP monitoring stations that focus on these specific reaches. These areas (Figure 1) are concentrated in the uppermost segments of the Mississippi River. The river sections presently monitored under LTRMP for water quality include Pools 4, 8, 9, 12, 13, 14, and 26 in the impounded portion of the Upper Mississippi River; 130 km (80 miles) of the open river above the Ohio River confluence at Cairo, Illinois; and La Grange Pool of the Illinois River. All of the major tributaries of the Mississippi and Illinois Rivers in these river segments are monitored under the LTRMP. The long (400 km) reach of the Upper Mississippi River between Pools 14 and 26 is not monitored under the LTRMP, but other state and Federal programs collect water quality information in this reach and adjoining tributaries (i.e., Iowa-Cedar, Rock, and Des Moines Rivers).

Personnel from the Illinois Natural History Survey conduct LTRMP monitoring in the vicinity of Pool 26, defined by Lock and Dam 26 at Mississippi River mile 200.8 and Lock and Dam 25 at Mississippi River mile 241.4. The replacement of Lock and Dam 26 with the present structure (Melvin Price Locks and Dam) catalyzed the development and authorization of the Environmental Management Program, of which the LTRMP is a part. Sampling by the LTRMP water quality team extends beyond the limits of Pool 26 and includes portions of the Mississippi River below Lock and Dam 26, the Missouri River, the Illinois River, and other tributaries (Figure A-1). Under the LTRMP, water quality has been monitored in the Pool 26 area since July 1988 (Appendixes A and B).

The Pool 26 study area is a major junction in the Mississippi River drainage basin and includes the confluences of the Illinois River (near Grafton, Illinois) and the Missouri River (at St. Louis, Missouri). These major tributaries strongly influence limnological conditions in this study reach, and the Missouri River input dramatically changes the size and character of the Mississippi River.

Six to eight other notable tributaries enter this reach of the Mississippi River. Although their discharge is minor in relation to that of the Illinois and Missouri Rivers, after locally heavy rainfall their inputs can dramatically alter the limnological conditions of the Mississippi River; primarily because most of these streams drain agricultural areas, and some drain highly urbanized areas.

The total water surface area of the pool (between Lock and Dam 26 and Lock and Dam 25) is about 9,300 ha. Most (4,900 ha) is main channel and side channel: a relatively small portion (400 ha) is contiguous backwater. In recent years, many of the contiguous backwaters have been leveed off from the Mississippi and Illinois Rivers, and control structures are now used to regulate their connection to the river. Some levees have been built by private hunting clubs that manage the backwaters for waterfowl hunting. Others have been constructed by government agencies as part of Habitat Rehabilitation and Enhancement Projects (HREP) with the intent of reducing sedimentation rates in the backwaters while managing the areas to enhance fish and wildlife habitat. The largest example of an HREP in the Pool 26 area is at Swan Lake, which alone is the "lake" sample stratum for the LTRMP in this area.

Monitoring Network and Sampling Design

The LTRMP was begun in 1988; field stations were added to the network from 1988 to 1991 (Table 2). This staggered start is significant when making comparisons among study areas or assessing overall trends across the system. Limnological monitoring during the first years (1988–91) was limited to fixed sites and to in situ physical and chemical measurements. The present LTRMP sampling design (implemented in June 1993) includes both fixed-site (Appendix A) and stratified random sampling (SRS; Appendix B) and combines in situ field measurements with laboratory analyses of chemical constituents (Appendix C).

Table 2. Period of operation for each of the Long Term Resource Monitoring Program field stations.

Field station	1988	1989	1990	1991	1992–1996
Lake City			Jan		
Onalaska	Jul				
Bellevue	Aug				
Pool 26	Jul				
Open River				Mar	
Havana		Sept			

Fixed-site sampling in the present design monitors inflows (tributaries and dam releases) and outflows from each of the LTRMP study areas. Secondarily, fixed sites are used to monitor locations of special significance, either because of their long data record or some other feature that makes them notable or especially interesting. Each LTRMP field station monitors about 15–30 fixed sites biweekly with no attempt to capture or avoid high or low flows (Appendix A).

From 1988 to 1993, the LTRMP used 24 aquatic habitat classes (Appendix A) to describe the permanently fixed monitoring sites. Some of these classes included a seasonally varying attribute (aquatic vegetation) as part of their definition, and the classes were not mutually exclusive. For example, a site in midchannel downstream of a dam might be classified as "Main Channel" (MC), "Channel Trough" (CTR), "Open

Tailwater" (TWR-O), or "Tailwater" (TW). This classification scheme was revised in 1993 when vegetation status was dropped from the habitat designators and those categories that were viewed as redundant or not distinguishable by routine water quality measurements were eliminated. The revised system has seven habitat classes (Table A-4), and all previous habitat classifications for fixed sites were converted to this system. The original designations for all fixed sites are permanently on file at UMESC and at the individual field stations.

As with the six field stations, the period of record differs among individual fixed sites. When the emphasis of fixed-site sampling shifted to tributaries and other transport monitoring points in 1993, sites were added and eliminated from the sampling network in each study reach. At the same time, sampling frequency at fixed sites was reduced from weekly to biweekly (Figure A-2) to keep the overall level of monitoring constant despite the addition of SRS.

The habitat class associated with each fixed site provides useful ancillary information about the site and a convenient way to retrieve data from the LTRMP database. However, LTRMP fixed-site data cannot be used generally to make inferences about these habitat classes because fixed sites were chosen subjectively and without randomization and represent only specific locations. Although the sampling sites can be grouped by their habitat categories, the resultant groupings are not unbiased samples of these categories. To overcome this limitation, the monitoring design was modified in 1993 to include SRS and thus provide unbiased information about broad spatial areas.

The LTRMP design for fixed-site sampling and SRS, established in September 1993, requires that each day's sampling effort be centered on noon (1200 h), central standard time, and that the order of site visits within each sampling day be randomized to the extent feasible within operational constraints.

The SRS complements the fixed-site design and provides a seasonal assessment of known precision and confidence on limnological conditions in broad sampling strata in the LTRMP study areas. Limnological data from SRS are intended to be linked to patterns in fish, vegetation, and invertebrates at the spatial scale of a whole navigational pool or river reach and at temporal scales ranging from seasons to decades. The SRS data can be interpreted confidently at these scales of space and time. Higher resolution questions (e.g., short-term movements or locations of fish, growth dynamics within individual aquatic plant beds) are outside the realm of routine monitoring as defined by the LTRMP and are not addressed by SRS or fixed-site sampling in the LTRMP monitoring design.

The SRS is performed in four quarterly episodes each year (Appendix B). Each SRS episode has 100–150 sites selected from six sampling strata and sampling is completed usually within 14 days (Appendix B). The sampling strata are condensed from the geomorphic "aquatic areas" of Wilcox (1993) and are objectively defined in a geographic information system (Owens and Ruhser 1996). Specific sampling points for each sampling episode are selected by overlaying a square grid with 200-m spacing on a map of the sampling strata. Grid intersections are randomly selected for each sampling episode. Beginning in spring 1995, a 50-m grid was used for side channel and backwater strata. A smaller grid spacing was deemed appropriate to the spatially diverse conditions within these strata (i.e., points 50 m apart are likely to be different); this increases the number of potential sites available for site selection. Although the number of sites selected was not altered by this change in grid spacing, the number of locations resampled in subsequent episodes was greatly reduced. The allocation of samples among strata emphasizes off-channel areas and is not proportional to the surface area of the strata (Appendix B). Data from the strata must be weighted to obtain accurate poolwide or reachwide estimates, and this weighting must account for the areas of the strata, the differing grid intervals among the strata, changes to the grid in 1995, and the allocation of sampling effort (Appendix B).

The sampling strata used by the LTRMP are primarily a statistical tool that allows the spatial allocation of sampling effort to match differences in desired precision and variability among the strata. An exact correspondence between sampling strata and the aquatic areas of Wilcox (1993) is not attainable and is not required by the LTRMP statistical design. The data from a sampling stratum, therefore, should not be regarded as precisely representing a specific aquatic area type.

Because the river is dynamic, the borders of the aquatic areas change over time, but the sampling strata boundaries have been (with minor exceptions) static since their original designation in 1993. Thus the aquatic areas are expected to gradually diverge from the sampling strata because of long-term changes in river morphology. In addition, short-term fluctuations in water level can make sites unusable or atypical of their parent stratum. The field teams use data comments to report sites that cannot be sampled or seem to be outside their designated sampling stratum. These comments are extremely valuable for data interpretation and also give a rough indication of the rate or extent of divergence between the sampling strata and the aquatic areas. However, field comments lack the spatial intensity and consistency required for tracking or mapping changes in stratum boundaries, and the LTRMP staff intends to track changes in aquatic areas by systemwide remapping and reclassification of areas at regular (e.g., 10-year) intervals. If future remapping results in new sampling strata, all sampling locations will have both pre- and postrevision stratum codes assigned. This will allow analysis for the full period of monitoring to be based on either mapping scheme.

The capacity of the LTRMP analytical laboratory has restricted the number of chemical measurements performed on SRS samples. Consequently, from 1993 to 1996 SRS has included major plant nutrients, suspended solids, and phytopigments, but has excluded major cations (sodium, magnesium, calcium, potassium) and major anions (chloride and sulfate). In situ measurements are made at all SRS sites; to reduce the laboratory sample load, samples are collected for a full complement of laboratory analyses only in a randomly selected subset (about half) of sites.

Sample Collection

The LTRMP limnological monitoring includes measurements at multiple depths (Soballe and Fischer 2003). About 80% of LTRMP measurements from 1993 to 1996 were taken near the water surface (0.0 to 0.20 m); laboratory analyses during this period were performed only on near-surface and near-bottom samples. The LTRMP sampling for water quality is generally restricted to waters 0.2 m deep or deeper. However, samples are occasionally collected in shallower waters, particularly under ice cover, when they can be taken without disturbing the substrate. Discrete, rather than integrated, samples are collected and analyzed. Grabs for chemical analyses are taken with either a bucket (near surface) or a Van Dorn sampler (at depth).

When the sampling design was revised in 1993, grab-sampling techniques remained unchanged; however, individual instruments used to monitor pH, conductivity, temperature, and dissolved oxygen were replaced by a multiparameter monitoring device used for in situ measurement and recording. The LTRMP Procedures Manual (Soballe and Fischer 2003) provides additional details.

Ice cover can vary widely in extent and thickness across the study area, complicating sample collection and the recording of sample information. It is not meaningful, for example, to report limnological conditions at 0.2 m below the water surface when the ice extends below this depth, nor to report maximum water depth when ice extends into the substrate. Consequently, when ice is present, LTRMP crews collect near-surface samples at 0.2 m below the bottom of the ice (where possible). The reported sampling depth in this situation (0.2 m) must be adjusted for the vertical extent of ice below the water surface (also recorded) to determine

the actual vertical location of the sample in reference to the free water surface. Here we summarize the data by depth sampling category rather than precise vertical location; sampling depths have not been adjusted for the vertical extent of ice below the water surface. In addition, sites that were frozen to the substrate have been excluded from the summaries of water depth.

Laboratory Analyses

The LTRMP added a limited suite of laboratory analyses to the limnological monitoring in 1991 and expanded the list of chemical constituents in 1993 (Appendix C). From 1991 to 1993, samples for chemical analyses were collected biweekly during the ice-free period; this frequency was reduced to monthly in winter. Also during this period, chemical analyses were performed at the Waterways Experiment Station (WES) laboratories at Vicksburg, Mississippi, and the U.S. Army Corps of Engineers Eau Galle laboratory near Spring Valley, Wisconsin. In 1993, analysis of LTRMP limnological samples was gradually shifted to the UMESC (Table C-2).

In late summer and fall 1996, the UMESC analytical laboratory experienced contamination of the equipment used for total phosphorus analyses. The source of the problem was eventually identified and eliminated in December 1996; those analytical results affected by this contamination have been excluded from this report and are identified in the LTRMP database. The laboratory also experienced ammonia contamination of the equipment in May 1996, which invalidated many of the ammonium samples collected in spring 1996 SRS episode. Those data have also been excluded from this report. Detailed descriptions of the methods used by the UMESC and WES laboratories are available on request from the UMESC in La Crosse, Wisconsin.

Quality Assurance and Quality Control Procedures

The value of LTRMP data depends on their quality and reliability. The use of standard methods to assure and control the quality of the data are thus extremely important. The original LTRMP procedures (Lubinski and Rasmussen 1988) gave guidance on instrument calibration, record keeping, data management, and organizational relations. Revisions to the procedures (Soballe and Fischer 2003) provided details on assessing the accuracy and precision of field measurements and also addressed issues (i.e., daily and seasonal sampling windows, randomization of sampling sites and times) related to the conduct of field work. Guidelines for the time of sampling and randomization of sampling order were implemented in 1993, and compliance with these guidelines is reported here (Appendix D).

The LTRMP field teams began collecting additional Quality Assurance and Quality Control (QA/QC) measurements and samples near the end of April 1995 to assess the accuracy and precision of both laboratory and field measurements. The QA/QC sampling data are readily available (http://www.umesc.usgs.gov/data_library/water_quality/water_quality_page.html), but not summarized here.

Following the recommendations of APHA (1992), at least 5% of each type of chemical or physical measurement collected by an LTRMP water quality team is accompanied by a series of QA/QC measurements, and each sampling crew is required to perform at least one QA/QC series during each day of field work. The daily crew requirement results in about 15% of all samples being accompanied by QA/QC measurements, exceeding the APHA recommendation and LTRMP minimum requirement. Because of logistic constraints, the LTRMP did not use field spikes (additions of known concentrations of chemical constituents)in 1993–96, but did collect four types of QA/QC samples:

Routine: The regular or routine sample or measurement taken at the site.

Field Split: A field sample that is as similar as possible to the routine sample at the point of collection. It is used to evaluate laboratory precision and variability introduced by field handling or processing. Field splits are performed for all the constituents listed in Table C-2 that are presently analyzed.

Blank: A sample used to check for contamination of the analytical water supply or sample containers, or contamination and losses during handling and storage. It is also used to evaluate precision at concentrations near the detection limit.

Replicate: A second, separate sample taken at the same location and in the same way as the routine, but separated by an interval of 5–10 minutes. This provides information on natural, random background variability in ambient conditions.

Results

River Discharge Regime

River discharge (flow) is a major factor in the ecological and limnological structure and functioning of the UMRS. Flow strongly influences limnological conditions and, thus, the interpretation of the monitoring data must consider the hydrologic setting (flow regime) under which the data were collected. Because river discharge is so important, staff of the LTRMP have assembled the Mississippi and Illinois Rivers discharge and surface elevation data collected by the U.S. Geological Survey and the U.S. Army Corps of Engineers into a database at the UMESC (Wlosinski et al. 1995). The discharge and water elevation data used in this report were obtained from that database.

Water levels in Pool 26 are influenced by discharge from the Mississippi, Illinois, and Missouri Rivers. The pool is regulated at a midpool control point by the U.S. Army Corps of Engineers. These factors combine to give Pool 26 a highly fluctuating hydrologic regime, and three sets of hydrographs are needed to accurately represent the fluctuations in differing portions of this reach (Figure 2). Gages are located at the upper end of the pool at Lock and Dam 25 tailwater (Winfield Gage; Figure 3a), at midpool (Grafton Gage; Figure 3b), and at the downstream end near Lock and Dam 26 (Alton Gage; Figure 3c). Flood stages at Winfield, Grafton, and Alton Gages are 131.98 m (433.0 feet), 128.56 m (421.79 feet), and 128.3 m (421.0 feet) above mean sea level, respectively. The U.S. Army Corps of Engineers discharge data were obtained from the UMESC (Wlosinski et al. 1995).

The water elevations at these three gages reflected the midpool regulation scheme used in this reach of the river. High discharges entering upstream are managed by downstream drawdowns that keep water levels relatively constant at midpool. The highly regulated nature of the hydrograph is clearly evident at the Grafton and Alton gaging sites.

Extreme discharges during the flooding of 1993 are evident at each of the gaging sites. This flood was remarkable not only for the extremely high elevation of the floodwaters, but also for its duration (the entire spring and summer). The stage data also show that the spring floods (except for 1994) have been above flood stage and above the 56-year average, and discharge between floods has also been slightly above average.

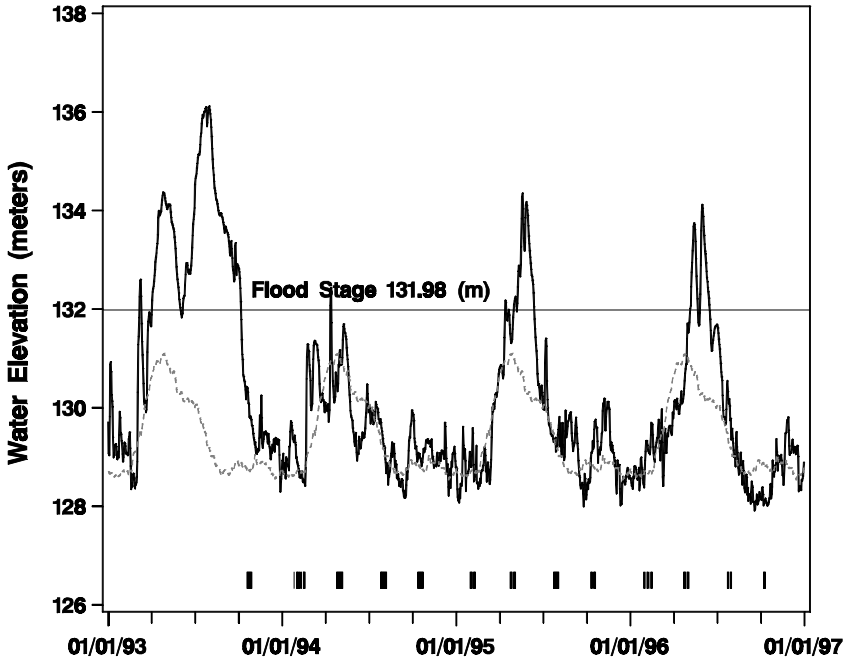

Figure 3a. Water elevation (meters above mean sea level) at Winfield, Illinois, from 1993 through 1996 (*solid line*) and the 1940–1996 average annual hydrograph (*dashed line*). Vertical lines above the horizontal axis indicate dates of stratified random sampling. Water elevation for flood stage is indicated by the horizontal line.

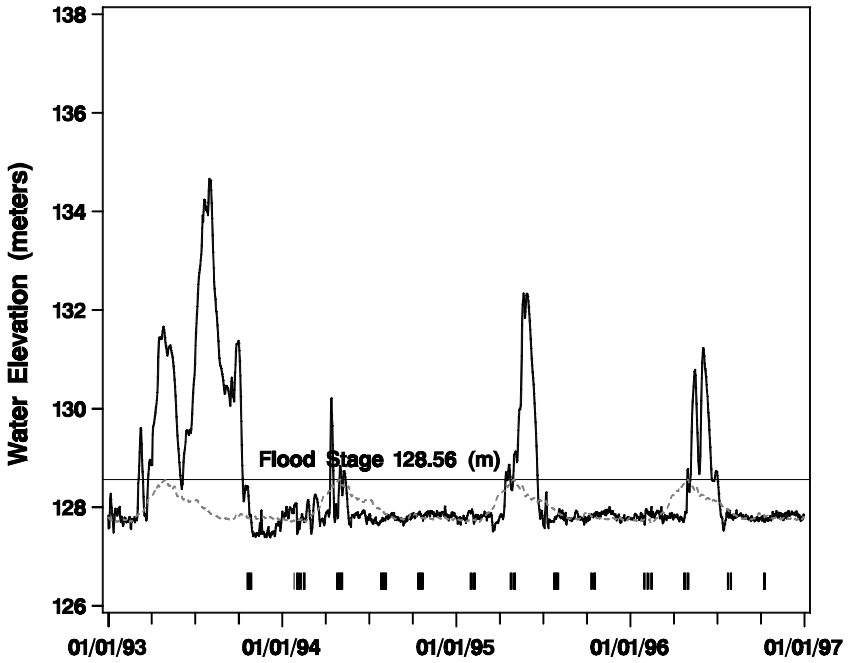

Figure 3b. Water elevation (meters above mean sea level) at Grafton, Illinois, from 1993 through 1996 (*solid line*) and the 1940–1996 average annual hydrograph (*dashed line*). Vertical lines above the horizontal axis indicate dates of stratified random sampling. Water elevation for flood stage is indicated by the horizontal line.

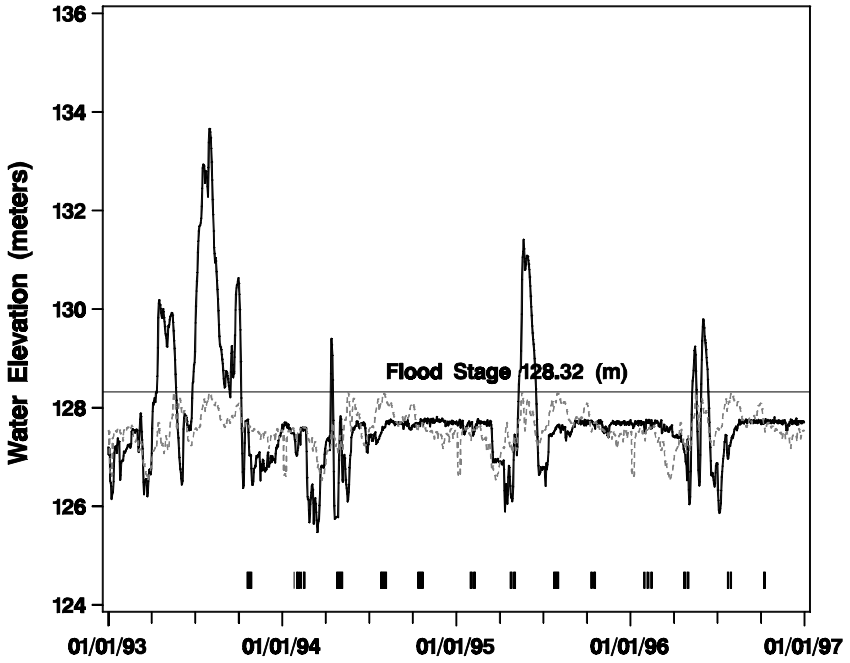

Figure 3c. Water elevation (meters above mean sea level) at Alton, Illinois, from 1993 through 1996 (*solid line*) and the 1940–1996 average annual hydrograph (*dashed line*). Vertical lines above the horizontal axis indicate dates of stratified random sampling.

Fixed-site Sampling

Sample Collection and Field Measurements

The volume of field work completed by each field station is important to document for planning and budgetary purposes. The schedule of sample collection is also important to document because many of the limnological characteristics monitored by the LTRMP exhibit regular daily (diel) patterns. The time of measurement can thus strongly influence the value that is observed and, because the LTRMP strives to monitor patterns over time across the UMRS, it is important that sampling times remain consistent and unbiased with regard to location over the duration of the program, among sampling locations, and among field stations.

In 1993–96, the Pool 26 water quality team made about 1,700 site visits to fixed sampling locations. During these visits, about 1,400 grab samples were collected for chemical processing (Appendix E). The number of site visits during a week of sampling was about 16–20 (Figure D-1 and Table D-1); the redesign in 1993 had little effect on the weekly number of site visits (Figure D-1). Deviations from the normal fixed-site sampling schedule were sometimes required because of unsafe field conditions or equipment failures (Table D-1).

The distribution of sampling across the hours of the day (Figures D-2–D-4) also shows little effect of the September 1993 change in the fixed-site sampling protocol. From 1993 to 1996, sampling was conducted primarily in the morning hours and shows a broad distribution centered on about 1100 h. This pattern continued after the sampling window was formally defined and confounds comparison of Pool 26 data to that obtained by the LTRMP in other reaches. The distribution of median sampling times for sites (Figure D-4)

shows a differing pattern each year (Figure D-1) that does not center on 1200 h. The tendency to sample before noon is pronounced, and there is also a minor, but significant ($P < 0.001$), linear increase in sampling time at the fixed sites from 1993 to 1996 (about 3 minutes per year), which probably reflects the continuing effort of the water quality crew to move the average sampling time as close as possible to 1200 h.

The distribution of fixed-site sampling times across the period of record (Figure D-3) gives some indication of a seasonal pattern, with earlier sampling in summer and later sampling in winter. The earlier sampling in summer is due in part to the field team operating on local clock time (daylight savings time), rather than remaining on central standard time year-round. Sampling in winter was later in the day because of delays inherent in winter sampling, such as increased travel time through ice and snow and time-consuming winter safety precautions. Although the forces that cause earlier sampling in summer and later sampling in winter will continue, the water quality crew is attempting to minimize their effect through better time management.

Fixed-site Sampling Data

Fixed-site sampling by the Pool 26 Field Station staff from 1993 to 1996 has generated a large volume of data (Appendix E). These data allow comparisons of tributary and main-stem inflows and outflows within this study area and thus provide information on sources of material such as nutrients and suspended sediment and the functioning of the study reach as a processor of those materials.

The fixed-site data document a number of notable patterns and reveal important functional aspects of Pool 26 and this reach of the Mississippi River, including the differing characteristics of the Mississippi River main stem, the Illinois River, and the Missouri River. Perhaps the most notable difference in water quality between the Mississippi and the Missouri Rivers is the consistently higher turbidity in the Missouri River (Figure E-1b). Not surprisingly, the related parameters, silicate and total suspended solids, are also higher in the Missouri River (Figure E-2b). The Mississippi River main stem is higher in dissolved oxygen and chlorophyll *a* than either the Illinois or Missouri Rivers (Figures E-1 and E-2, Tables E-1 and E-2).

The increase in nitrate from upstream to downstream in Pool 26 (Figure E-2a) suggests that this reach and its tributaries are a significant source of this material. For example, the Illinois River has concentrations of total nitrogen, nitrate, total phosphorus, and soluble reactive phosphorus that are usually higher than in the Mississippi River main stem (Table E-2). In contrast, the Missouri River has total nitrogen and nitrate concentrations that are usually lower than in the Mississippi River main stem. Total phosphorus is usually higher in the Missouri River, whereas soluble reactive phosphorus concentrations are roughly similar between the two rivers but are more variable in the Mississippi River main stem (Appendix E).

The fixed-site data for Pool 26 show a long-term decline in the concentrations of total and nitrate–nitrite nitrogen and soluble reactive phosphorus after the large flood in 1993 (Figure E-2a). Long-term trends for other parameters are not as apparent. The fixed-site data show only weak seasonality for the chemical measurements and for most physical measurements. Exceptions are suspended solids and turbidity, which are closely tied to the flow regime; suspended solid concentrations and turbidity peaked in each annual spring flood (Figures E-1 and E-2).

Dissolved oxygen solubility is a function of water temperature and thus dissolved oxygen shows strong seasonality at all sites (Figure E-1). Monthly means do not reveal extremes in dissolved oxygen, and the LTRMP sampling schedule (centered on noon) is not designed to give a good representation of extremely low (expected near sunrise) or high (expected in mid- or late afternoon) oxygen concentrations. The fixed-

site dissolved oxygen data show that during this reporting period, dissolved oxygen levels were good (>5 mg/L) in the Mississippi River main stem and were somewhat lower in the Missouri and Illinois Rivers. In the Illinois River, where summertime dissolved oxygen concentrations reached especially low levels, concentrations reached 5 mg/L or less every summer during 1993–96 (Appendix E). A 5 mg/L minimum is the Illinois State water quality standard for general use.

Stratified Random Sampling

Sample Collection and Field Measurements

As in fixed-site sampling, the number and frequency of samples collected and the scheduling of sample collection in SRS is important for planning and data interpretation. Sample collection in SRS must be consistent and unbiased over time within each sampling episode, across sampling strata, and among LTRMP field stations. The partitioning of effort among strata within each SRS episode (Table B-1) reflects an emphasis on off-channel areas and a recognition that these areas are probably more spatially variable than the main channel.

During 1993–96, Pool 26 Field Station personnel participated in 13 SRS episodes. In these 13 episodes, the field team visited about 1,450 sites (Appendix B) and collected about 1,400 grab samples for chemical analyses. All of these were analyzed for chlorophyll *a* and suspended solids, but in accord with the design for SRS, about half of the samples were also analyzed for nitrogen and phosphorus species.

The total number of sites sampled in each episode and stratum is relatively uniform across the period of record (Table B-2). The flood of 1993 prevented the Pool 26 Field Station from conducting SRS in spring of that year, and winter 1994 showed significantly lower sample numbers because of hazardous weather and unsafe ice conditions that prohibited safe field operations for much of this episode.

Although SRS by the Pool 26 field team has conformed to the general LTRMP design, some minor adjustments are needed. The distribution of SRS times across the period of record (Figure D-5) shows no obvious seasonal pattern and, for most strata, no significant linear trend in sampling times over the years ($P > 0.05$). However, sampling times in Swan Lake and the impounded area exhibit a slow increase over time (4–6 minutes per episode). The increase in Swan Lake (about 6 minutes per episode) is statistically significant ($P = 0.01$), whereas that in the impounded area (about 4 minutes per episode) is marginal ($P = 0.07$). As with fixed-site sampling, SRS has been consistently skewed, with the bulk of samples collected before noon. A tendency to sample the main channel and impounded strata later in the day than other strata is also evident. The sampling protocol is being reviewed to determine whether the distribution of sampling times and strata over the course of a day can be improved.

Stratified Random Sampling Data

The SRS provides an unbiased estimate of conditions within each sampling stratum during each of four quarterly episodes per year. Seasonality, interannual variations, and long-term trends within each stratum can be assessed with summaries of these data (Appendix F); however, some of the most valuable applications for these data require analyses that are beyond the scope of this report. For example, the SRS provides statistically valid estimates of the extent or frequency of limnological conditions in combination (e.g., to meet the temperature, dissolved oxygen, and velocity requirements of overwintering fish); this information is being used to address changing relations among limnological variables over time, differences among the sampling

strata, and habitat availability and suitability in the Upper Mississippi River ecosystem (Fischer et al. 1997; Soballe et al. 1997).

The data collected by the Pool 26 field team in SRS capture long-term patterns in this reach of the river and document significant differences among the sampling strata (aquatic areas). The contiguous backwater stratum has higher turbidity, volatile suspended solids, and fluorometric chlorophyll *a* than the main and side channels. Mean ammonium nitrogen, temperature, and dissolved oxygen levels are not strikingly different in the contiguous backwaters, but are much more variable than in the main or side channel strata. This variability may be due in part to the shallowness and general lack of current in the backwaters, which makes them more easily heated and cooled. Total nitrogen and nitrate–nitrite nitrogen tend to be lower in the backwaters than in the main and side channels, suggesting that the backwater areas may be either sinks for nitrogen or diluted sources of nitrogen (Figure F-1a).

The SRS data for Swan Lake show a slight decline in dissolved oxygen and slight rises in turbidity, suspended solids, and volatile suspended solids (not plotted) in the lake (Figures F-2, F-3, F-6, and F-7). Monitoring will be required to determine if these trends will continue after completion of the Swan Lake Habitat project now under construction. This HREP includes a levee designed to isolate Swan Lake from the Illinois River and a series of artificial islands designed to reduce wind-fetch and sediment resuspension.

The large flood of 1993 prevented the Pool 26 field team from conducting SRS in spring and summer of that year. Consequently, these data (Appendix F) do not indicate the decline in nitrogen concentrations from 1993 to 1996 as clearly as the fixed-site data. However, they do demonstrate a spring–summer peak in total nitrogen, nitrate–nitrite nitrogen, turbidity, total suspended solids, fluorometric chlorophyll *a*, and volatile suspended solids (not plotted) in the main channel that is typical of most years (Figures F-6, F-7, F-8, F-9, and F-13).

The pronounced seasonality in chlorophyll *a* parallels that of volatile suspended solids, suggesting that algae may contribute significantly to the total organic particulate material in this reach, even though the majority of suspended material is inorganic (Figure F-7). Although lower concentrations of chlorophyll *a* and volatile suspended solids are typical in winter, these levels are still significant (mean fluorometric chlorophyll *a* = 5–7 µg/L; mean volatile suspend solids = 3–6 mg/L), suggesting that the Mississippi River produces or transports significant quantities of algae during winter (Table F-1).

The strong seasonality of dissolved oxygen concentration is driven primarily by water temperature, and the effect of phytoplankton production on dissolved oxygen is not readily apparent without further analysis. Dissolved oxygen concentration and fluorometric chlorophyll *a* are more variable in contiguous backwaters than in other strata, consistent with a relation between them.

Summary and Recommendations

In this report, we document 4 years of LTRMP monitoring (1993–96) by the Pool 26 Field Station at Brighton, Illinois, and provide basic graphic and tabular summaries of the collected data. The field team completed about 1,700 visits to fixed sampling sites and 1,450 visits to stratified random sites from 1993 through 1996. This period was marked by several important events, including the redesign of the monitoring network and the updating of field equipment in 1993, record flooding in spring and summer 1993, severe weather in winter 1994 that limited sampling, and the initiation of a QA/QC program in 1995.

The monitoring data show that this reach of the Upper Mississippi River is turbid, has near-saturated dissolved oxygen concentrations at most locations throughout most of the year (near midday), and has high concentrations of plant nutrients (particularly nitrogen). The data show decreases in total nitrogen concentrations and nitrate–nitrite nitrogen following the large flood of 1993. The Swan Lake sampling stratum had a slight decline in dissolved oxygen concentration and slight increases in turbidity, suspended solids, and volatile suspended solids over this period.

The data show that the Illinois River is a significant source of nutrients and sediment to this reach. The data also document the character of the Missouri River, which tends to have elevated phosphorus, but relatively low nitrogen concentrations. In addition, the Missouri River has higher turbidity, suspended solids, and silicate concentrations than the Mississippi River.

Contiguous backwaters are unique among the sampling strata, with higher turbidity, volatile suspended solids, and fluorometric chlorophyll *a*, and lower total nitrogen and nitrate–nitrite nitrogen than in the main and side channels. Ammonium nitrogen, temperature, and dissolved oxygen were more variable in contiguous backwaters than in other sampling strata.

Seasonal patterns were exhibited by total nitrogen, nitrate–nitrite nitrogen, turbidity, total suspended solids, fluorometric chlorophyll *a*, and volatile suspended solids, which peaked in the main channel in spring–summer. Dissolved oxygen concentration also showed pronounced seasonality that paralleled temperature.

The data indicate that continued monitoring will be required to detect long-term trends or assess the spatial distribution of habitat over time and to adequately measure the long-term factors that control water quality in the Mississippi River and its major tributaries in the Pool 26 vicinity.

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Appendix A. Fixed-site Sampling Sites: January 1993–December 1996

In Appendix A, we provide information on the sample collection sites used from January 1993 through December 1996. In some instances, sites not used during this period have been included for reference. The site description tables provide additional information on the locations and are keyed to the site map. The site lists are provided in three formats to allow easy cross referencing: (1) by map identifier (north–south, then east–west), (2) in alphabetical order, and (3) by habitat class. The period of record for each site is also portrayed graphically (Figure A-5) so that the duration of and interruptions in the record can be easily visualized.

Location codes (seven characters) used for routine fixed-site sampling are based on the distance upstream from the river mouth or major confluence (river miles and tenths) and on the relative left-to-right (facing upstream) location of the site between the horizontal limits of the geological–historical floodplain. Sites on the Mississippi and Illinois River main stems use a single-letter prefix (M or I, respectively), whereas tributaries and Missouri River sites use a two-letter prefix (Table A-5). The left-to-right location of a site is indicated by a suffix between A and Z. When tributary sites are sampled in midstream, they are assigned the suffix M without regard to position in the floodplain. Locations near the left or right bank (facing upstream) are indicated with an A or Z, respectively.

Habitat classes (Table A-4) are assigned to all Long Term Resource Monitoring Program sampling locations used in fixed-site monitoring. Although these classes convey significant information about the site, the fixed sites are subjectively chosen and cannot be assumed to represent the associated habitat classes (see stratified random sampling, Appendix B).

Table A-1. Long Term Resource Monitoring Program fixed-site water quality sampling locations keyed to map codes with associated period of record from 1993 through 1996, habitat class, Universal Transverse Mercator (UTM) Coordinates (zone 15, meters), and the number of sampling visits to the site.

Location code	Map identification	Period of record	Habitat class[a]	UTM		Site visits 1993–1996
				Easting	Northing	
M241.4K	1	10/05/90–12/13/96	MC	700637	4319647	92
I007.0W	2	08/05/88–12/12/96	MC	712523	4315756	94
M219.4U	3	10/18/90–04/28/93	MC	720533	4315208	16
BC04.6M	4	05/03/93–04/11/94	TRIB	695569	4315141	16
M237.4T	5	07/29/88–04/28/93	MC	701569	4313786	16
I005.8K	6	08/04/88–04/28/93	BWC	714649	4313556	16
I005.7M	7	08/04/88–12/12/96	BWC	714703	4313347	61
PI00.2M	8	05/04/93–12/30/96	TRIB	735030	4313310	80
M212.4X	9	08/03/88–04/27/93	MC	731177	4313146	16
M237.2G	10	07/29/88–12/13/96	BWC	701683	4312554	85
M211.2P	11	07/19/88–04/27/93	MC	731978	4311972	16
M235.6J	12	07/29/88–04/28/93	MC	702973	4310861	16
CU11.6M	13	05/03/93–11/15/96	TRIB	695163	4310565	63
M235.5D	14	03/22/90–09/20/96	BWI	702472	4310285	70
M206.1T	15	08/04/88–12/31/96	BWI	739967	4309408	52
M206.0S	16	07/19/88–12/09/96	BWC	739884	4309158	88
M205.8K	17	07/27/88–04/05/93	BWI	739745	4308992	4
M224.2S	18	07/29/88–04/28/93	SC	716523	4308859	16
M203.5R	19	07/19/88–12/30/96	IMP	742896	4307339	76
M202.6T	20	05/30/95–12/30/96	MC	744053	4307283	40
M203.5Q	21	07/28/88–04/27/93	IMP	742887	4307244	16
M202.9Q	22	09/12/91–04/05/93	BWI	743661	4306774	4
M202.9N	23	09/12/91–04/05/93	BWI	743418	4306696	4
M202.2V	24	07/19/88–04/27/93	IMP	744990	4306563	16
PE01.8M	25	05/06/93–12/11/96	TRIB	703159	4306271	76
M202.2R	26	02/14/90–04/27/93	IMP-L	744769	4306204	16
M202.2N	27	02/14/90–12/30/96	IMP-L	743830	4306157	93
M201.7Q	28	06/03/93–12/30/96	IMP-L	744970	4305854	77
WD00.2M	29	05/05/93–12/10/96	TRIB	749105	4305319	50
DC01.0M	30	05/03/93–12/11/96	TRIB	712694	4303092	79
M196.9Q	31	05/05/93–12/31/96	MC	750631	4302053	83
MO02.0X	32	05/05/93–12/31/96	TRIB	748277	4301655	82
CA00.4M	33	05/05/93–12/31/96	TRIB	751328	4298975	78
M193.2F	34	05/05/93–12/31/96	MC	748748	4297372	82

[a]See Table A-4 for habitat class descriptions.

Table A-2. Long Term Resource Monitoring Program fixed-site water quality sampling sites sorted by location code with associated period of record from 1993 through 1996, habitat class, Universal Transverse Mercator (UTM) Coordinates (zone 15, meters), and number of sampling visits to the site.

Location code	Map identification	Period of record	Habitat class[a]	UTM		Site visits 1993–1996
				Easting	Northing	
BC04.6M	4	05/03/93–04/11/94	TRIB	695569	4315141	16
CA00.4M	33	05/05/93–12/31/96	TRIB	751328	4298975	78
CU11.6M	13	05/03/93–11/15/96	TRIB	695163	4310565	63
DC01.0M	30	05/03/93–12/11/96	TRIB	712694	4303092	79
I005.7M	7	08/04/88–12/12/96	BWC	714703	4313347	61
I005.8K	6	08/04/88–04/28/93	BWC	714649	4313556	16
I007.0W	2	08/05/88–12/12/96	MC	712523	4315756	94
M193.2F	34	05/05/93–12/31/96	MC	748748	4297372	82
M196.9Q	31	05/05/93–12/31/96	MC	750631	4302053	83
M201.7Q	28	06/03/93–12/30/96	IMP–L	744970	4305854	77
M202.2N	27	02/14/90–12/30/96	IMP–L	743830	4306157	93
M202.2R	26	02/14/90–04/27/93	IMP–L	744769	4306204	16
M202.2V	24	07/19/88–04/27/93	IMP	744990	4306563	16
M202.6T	20	05/30/95–12/30/96	MC	744053	4307283	40
M202.9N	23	09/12/91–04/05/93	BWI	743418	4306696	4
M202.9Q	22	09/12/91–04/05/93	BWI	743661	4306774	4
M203.5Q	21	07/28/88–04/27/93	IMP	742887	4307244	16
M203.5R	19	07/19/88–12/30/96	IMP	742896	4307339	76
M205.8K	17	07/27/88–04/05/93	BWI	739745	4308992	4
M206.0S	16	07/19/88–12/09/96	BWC	739884	4309158	88
M206.1T	15	08/04/88–12/31/96	BWI	739967	4309408	52
M211.2P	11	07/19/88–04/27/93	MC	731978	4311972	16
M212.4X	9	08/03/88–04/27/93	MC	731177	4313146	16
M219.4U	3	10/18/90–04/28/93	MC	720533	4315208	16
M224.2S	18	07/29/88–04/28/93	SC	716523	4308859	16
M235.5D	14	03/22/90–09/20/96	BWI	702472	4310285	70
M235.6J	12	07/29/88–04/28/93	MC	702973	4310861	16
M237.2G	10	07/29/88–12/13/96	BWC	701683	4312554	85
M237.4T	5	07/29/88–04/28/93	MC	701569	4313786	16
M241.4K	1	10/05/90–12/13/96	MC	700637	4319647	92
MO02.0X	32	05/05/93–12/31/96	TRIB	748277	4301655	82
PE01.8M	25	05/06/93–12/11/96	TRIB	703159	4306271	76
PI00.2M	8	05/04/93–12/30/96	TRIB	735030	4313310	80
WD00.2M	29	05/05/93–12/10/96	TRIB	749105	4305319	50

[a]See Table A-4 for habitat class descriptions.

Table A-3. Long Term Resource Monitoring Program fixed-site water quality sampling locations sorted by habitat class with associated period of record from 1993 through 1996, habitat class, Universal Transverse Mercator (UTM) Coordinates (zone 15, meters), and number of sampling visits to the site.

Location code	Map identification	Period of record	Habitat class[a]	UTM		Site visits 1993–1996
				Easting	Northing	
I005.7M	7	08/04/88–12/12/96	BWC	714703	4313347	61
I005.8K	6	08/04/88–04/28/93	BWC	714649	4313556	16
M206.0S	16	07/19/88–12/09/96	BWC	739884	4309158	88
M237.2G	10	07/29/88–12/13/96	BWC	701683	4312554	85
M202.9N	23	09/12/91–04/05/93	BWI	743418	4306696	4
M202.9Q	22	09/12/91–04/05/93	BWI	743661	4306774	4
M205.8K	17	07/27/88–04/05/93	BWI	739745	4308992	4
M206.1T	15	08/04/88–12/31/96	BWI	739967	4309408	52
M235.5D	14	03/22/90–09/20/96	BWI	702472	4310285	70
M202.2V	24	07/19/88–04/27/93	IMP	744990	4306563	16
M203.5Q	21	07/28/88–04/27/93	IMP	742887	4307244	16
M203.5R	19	07/19/88–12/30/96	IMP	742896	4307339	76
M201.7Q	28	06/03/93–12/30/96	IMP–L	744970	4305854	77
M202.2N	27	02/14/90–12/30/96	IMP–L	743830	4306157	93
M202.2R	26	02/14/90–04/27/93	IMP–L	744769	4306204	16
I007.0W	2	08/05/88–12/12/96	MC	712523	4315756	94
M193.2F	34	05/05/93–12/31/96	MC	748748	4297372	82
M196.9Q	31	05/05/93–12/31/96	MC	750631	4302053	83
M202.6T	20	05/30/95–12/30/96	MC	744053	4307283	40
M211.2P	11	07/19/88–04/27/93	MC	731978	4311972	16
M212.4X	9	08/03/88–04/27/93	MC	731177	4313146	16
M219.4U	3	10/18/90–04/28/93	MC	720533	4315208	16
M235.6J	12	07/29/88–04/28/93	MC	702973	4310861	16
M237.4T	5	07/29/88–04/28/93	MC	701569	4313786	16
M241.4K	1	10/05/90–12/13/96	MC	700637	4319647	92
M224.2S	18	07/29/88–04/28/93	SC	716523	4308859	16
BC04.6M	4	05/03/93–04/11/94	TRIB	695569	4315141	16
CA00.4M	33	05/05/93–12/31/96	TRIB	751328	4298975	78
CU11.6M	13	05/03/93–11/15/96	TRIB	695163	4310565	63
DC01.0M	30	05/03/93–12/11/96	TRIB	712694	4303092	79
MO02.0X	32	05/05/93–12/31/96	TRIB	748277	4301655	82
PE01.8M	25	05/06/93–12/11/96	TRIB	703159	4306271	76
PI00.2M	8	05/04/93–12/30/96	TRIB	735030	4313310	80
WD00.2M	29	05/05/93–12/10/96	TRIB	749105	4305319	50

[a]See Table A-4 for habitat class descriptions.

Table A-4. Habitat classes used in fixed-site water quality sampling. Previous habitat classes refer to categories used from 1988 through 1993 and are now combined within each of the present habitat classes.

Present habitat class designator	Previous habitat designators included in present class	Habitat class description
BWC	BWC, BWC-O, BWC-V	Contiguous backwaters
BWI	BWI, BWI-O, BWI-V	Isolated backwaters
SC	SC, SCB, SCT, SCU	Side channels
IMP	IMP-O, IMP-V	Impounded areas
IMP-L	IMP-L	Lakes—Swan or Pepin
MC	MC, CTR, CBU, CBW, TW, TWB, TWBU, TWR-O, TWW	Main channel
TRIB	TRIB, TRM	Tributary

Table A-5. Abbreviations used to designate fixed-site sampling locations in the Long Term Resource Monitoring Program (LTRMP). Not all streams in this list have been sampled by the LTRMP. The Mackinaw, Spoon, and Sangamon Rivers are all tributaries to the Illinois River. Each site identifier includes the distance (in miles) above the tributary mouth (xx.x) and the relative location (A–Z) of the sampling site between the left and right (facing upstream) limits of the floodplain.

Site identifier	Tributary name
APxx.xM	Apple River, Missouri
ALxx.xM	Apple River, Illinois
BCxx.xM	Bob's Creek, Missouri
BFxx.xM	Buffalo River, Wisconsin
BKxx.xM	Black River, Wisconsin
BMxx.xM	Big Muddy River, Illinois
BXxx.xM	Bad Axe River, Wisconsin
CAxx.xM	Cahokia Creek, Illinois
CCxx.xM	Coon Creek, Wisconsin
CFxx.xM	Catfish Creek, Iowa
CHxx.xM	Chippewa River, Wisconsin
CNxx.xM	Cannon River, Minnesota
CRxx.xM	Cache River, Illinois
CUxx.xM	Cuivre River, Missouri
DCxx.xM	Dardenne Creek, Missouri
DMxx.xM	Des Moines River, Iowa
ERxx.xM	Elk River, Iowa
HDxx.xM	Headwaters Diversion, Missouri (formerly Little River, LRxx.xM)
Ixxx.xZ	Illinois River, Illinois
IWxx.xM	Iowa River, Iowa
LMxx.xM	LaMoines River, Illinois
LRxx.xM	Little River, Missouri (now Headwaters Diversion, HDxx.xM)

Table A-5. Continued.

Site identifier	Tributary name
LXxx.xM	La Crosse River, Wisconsin
Mxxx.xZ	Mississippi River (main stem)
MCxx.xM	Mill Creek, Iowa
MKxx.xM	Mackinaw River, Illinois
MOxx.xM	Missouri River, Missouri
MQxx.xM	Maquoketa River, Iowa
PExx.xM	Peruque Creek, Missouri
PIxx.xM	Piasa Creek, Illinois
PRxx.xM	Plum River, Illinois
QVxx.xM	Quiver Creek, Illinois
Rxxx.xM	Root River, Minnesota
RCxx.xM	Rush Creek, Illinois
Sxxx.xM	Spoon River, Illinois
SGxx.xM	Sangamon River, Illinois
SKxx.xM	Skunk River, Iowa
SXxx.xM	St. Croix River, Minnesota/Wisconsin
UIxx.xM	Upper Iowa River, Iowa
VMxx.xM	Vermillion River, Minnesota
WDxx.xM	Wood River, Illinois
WPxx.xM	Wapsipinicon River, Iowa
WSxx.xM	Wisconsin River, Wisconsin
WWxx.xM	Whitewater River, Minnesota
YLxx.xM	Yellow River, Iowa
ZMxx.xM	Zumbro River, Minnesota

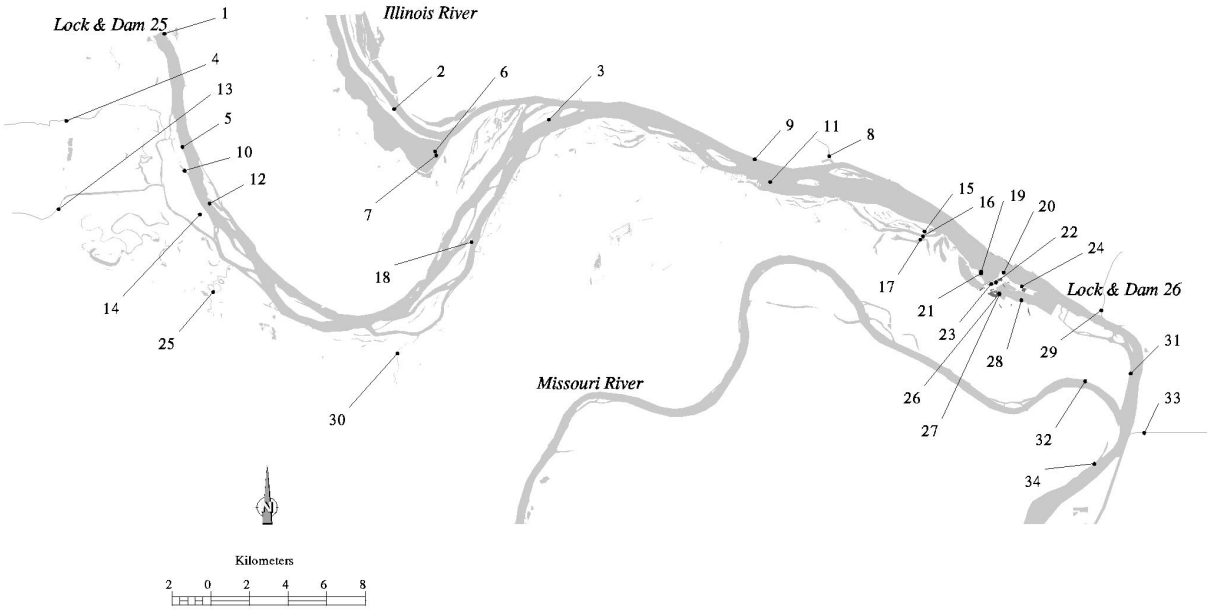

Figure A-1. Fixed-site sampling locations in the Pool 26 study area.

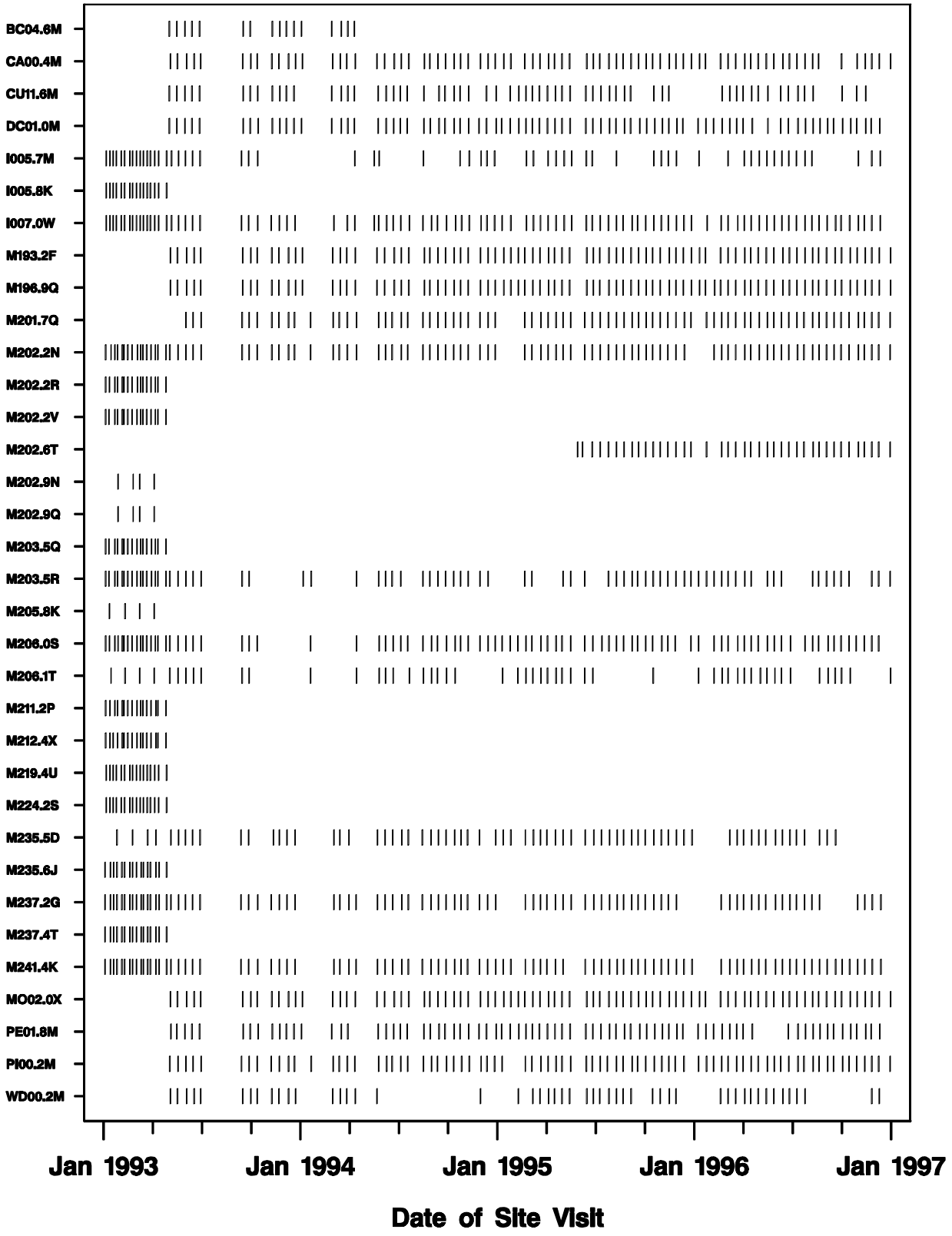

Figure A-2. Sampling dates from January 1993 through December 1996 at each of the fixed sites monitored by the Pool 26 Field Station.

Appendix B. Stratified Random Sampling Sites: January 1993–December 1996

Randomly selected sites are used in stratified random sampling (SRS) to provide an unbiased representation of sampling strata (and entire study areas) within each Long Term Resource Monitoring Program study reach. Individual sites are generally not resampled in subsequent SRS episodes. Information from an individual site is not intended to be interpreted in isolation, as it is only a single random measurement from all the locations within a stratum during a specific episode. When pooled together, multiple measurements (sites) from each stratum provide a statistically reliable sample of the episode and the study reach.

Unlike the fixed-site location maps (Appendix A), the maps provided for SRS do not show the individual sampling locations, but rather the sampling strata within the reach. This approach allows a legible portrayal and de-emphasizes the individual identities of SRS locations.

The tables in Appendix B show the allocation of sampling effort across the sampling strata and across the 14 SRS episodes within the 1993–96 period.

Table B-1. Sampling strata and design allocation of sampling effort for water quality stratified random sampling in the vicinity of the Pool 26 Field Station. Total area of the study reach is greater than the total area included within the sampling strata because of inaccessible areas that are excluded from sampling.

Sampling stratum	Area within the stratum (ha)	Fraction of study area within the stratum (%)	Number of potential sampling sites in the stratum[a]	Number of sites assigned	Fraction of stratum sampled (%)	Fraction of total effort (%)
Main channel	4,860	52	1,215	20	1.6	17
Side channel	1,496	16	5,983	42	0.7	35
Backwater	415	4	1,658	29	1.7	24
Lake	948		237	15	6.3	12
Impounded	176	2	44	15	34.1	12
Isolated	580	6	145	0	0.0	0
Total[b]	9,346	81	9,282	121	1.3	100

[a]Total potential sites reflects a 200-m grid in most strata but a 50-m grid in side channels and backwaters.
[b]Total area refers to the entire pool or study reach and is greater than the sum of areas within the sampling strata.

Table B-2. Sampling dates and sampling activity of the Pool 26 Field Station in each stratified random sampling episode from 1993 through 1996.

Sampling period			Number of samples collected/sites visited						
Episode	Start date	End date	Total	Main channel	Side channel	Contiguous backwater	Lake	Impoundment	Isolated
Fall 93	10/19/93	10/29/93	168/111	21/20	69/41	34/20	18/15	26/15	—
Winter 94	01/26/94	02/18/94	87/71	18/18	36/29	13/11	5/5	15/8	—
Spring 94	04/25/94	05/08/94	187/120	20/20	69/42	43/28	28/15	27/15	—
Summer 94	07/26/94	08/08/94	157/106	22/20	71/42	35/29	NA	29/15	—
Fall 94	10/12/94	10/24/94	153/121	21/20	58/42	33/29	15/15	26/15	—
Winter 95	01/30/95	02/10/95	118/99	20/20	45/41	27/23	NA	26/15	—
Spring 95	04/24/95	05/05/95	166/121	20/20	45/42	45/29	30/15	26/15	—
Summer 95	07/24/95	08/04/95	165/120	20/20	65/41	36/29	16/15	28/15	—
Fall 95	10/10/95	10/20/95	158/121	20/20	63/42	30/29	16/15	29/15	—
Winter 96	01/29/96	02/16/96	139/106	21/20	58/37	36/34	NA	24/15	—
Spring 96	04/22/96	05/03/96	165/121	20/20	57/42	38/29	25/15	25/15	—
Summer 96	07/23/96	08/01/96	149/121	20/20	62/42	31/29	15/15	21/15	—
Fall 96	10/07/96	10/11/96	162/106	20/20	80/42	34/29	NA	28/15	—

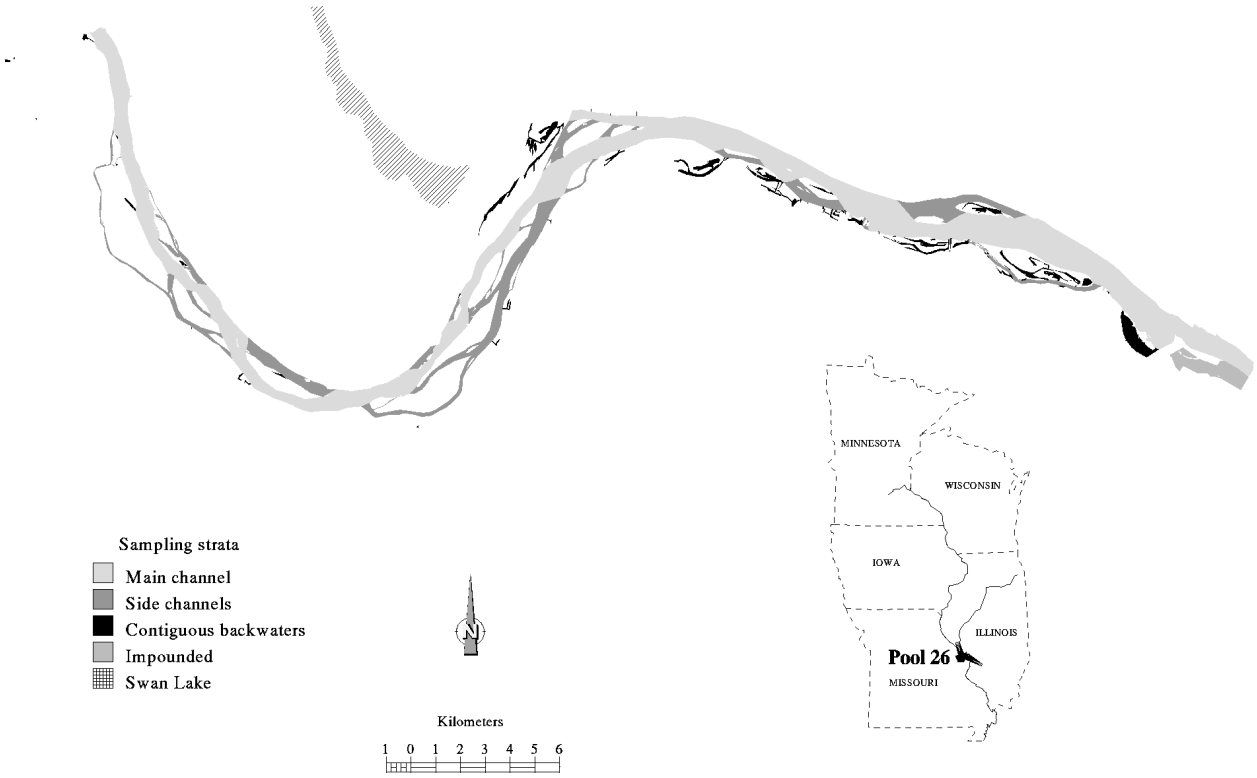

Figure B-1. Long Term Resource Monitoring Program sampling strata used in water quality stratified random sampling in the vicinity of the Pool 26 Field Station.

Appendix C. Limnological Parameters Measured in the Long Term Resource Monitoring Program

Table C-1. Period of record for limnological measurements (laboratory and in situ) performed by Long Term Resource Monitoring Program field teams from 1988 through 1996.

Parameter	1988	1989	1990	1991	1992	1993–1996
Water temperature	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Dissolved oxygen	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Conductivity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
pH				June [redacted]	[redacted]	[redacted]
Turbidity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Secchi depth	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total suspended solids				[redacted]	[redacted]	[redacted]
Volatile suspended solids				[redacted]	[redacted]	[redacted]
Chlorophyll *a*				June [redacted]	[redacted]	[redacted]
Total phosphorus				June [redacted]	[redacted]	[redacted]
Soluble reactive phosphorus				June [redacted]	[redacted]	[redacted]
Total soluble phosphorus				June [redacted]	[redacted]	[redacted] Apr 93
Total nitrogen				June [redacted]	[redacted]	[redacted]
Total soluble nitrogen				June [redacted]	[redacted]	[redacted] Apr 93
NO_x (nitrate–nitrite)				June [redacted]	[redacted]	[redacted]
NH_x (ammonium)				June [redacted]	[redacted]	[redacted]
Si (silicate)				June [redacted]	[redacted]	[redacted]
Cl (chloride)				June [redacted]	[redacted]	[redacted]
Ca (calcium)				June [redacted]	[redacted]	[redacted]
Mg (magnesium)				June [redacted]	[redacted]	[redacted]
Na (sodium)				June [redacted]	[redacted]	[redacted]
K (potassium)				June [redacted]	[redacted]	[redacted]
Fe (iron)				June [redacted]	[redacted]	[redacted] Feb 93
Mn (manganese)				June [redacted]	[redacted]	[redacted] Feb 93
Ice and snow	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Water depth	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Water velocity	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table C-2. Laboratory measurements performed on limnological samples from 1988 through 1996. Each laboratory processed samples or parameters between the dates listed. The precision of result reporting is shown in parentheses. Analytical techniques are described in the procedures manuals for the Waterways Experiment Station (WES) Environmental Laboratories and by the American Public Health Association et al. (1992).

	Laboratory		
Parameter and method	**WES–Vicksburg**	**WES–Eau Galle**	**UMESC[a]**
Total suspended solids: Gravimetric/105° C	—	June 91–June 93 (1 µg/L)	June 93–Present (1 µg/L)
Volatile suspended solids: Gravimetric/550° C	—	June 91–June 93 (1 µg/L)	June 93–Present (1 µg/L)
Chlorophyll *a*: Fluorometric-DMSO-acetone extraction	—	—	June 93–Present (1 µg/L)
Chlorophyll *a*: Spectrophotometric 90% acetone extraction	—	June 91–June 93 (1 µg/L)	June 93–Present (1 µg/L)
Total phosphorus: Automated/ persulfate/ascorbic acid	—	June 91–Jan. 94 (1 µg/L)	Jan. 94–Present (1 µg/L)
Soluble reactive phosphorus (H): Automated/H_2SO_4 preservation, ascorbic acid	June 91–Dec. 93 (1 µg/L)	—	—
Soluble reactive phosphorus: Automated/frozen/ascorbic acid	Jan. 94–Feb. 94 (1 µg/L)	—	Feb. 94–Present (1 µg/L)
Total soluble phosphorus Automated/persulfate/ascorbic acid	—	June 91–Apr. 93 (1 µg/L)	—
Total nitrogen: Automated/Devarda's alloy	—	June 91–Jan. 94 (0.01 mg/L)	Jan. 94–Present (0.01 mg/L)
Total soluble nitrogen: Automated/Devarda's alloy	—	June 91–Apr. 93 (0.01 mg/L)	—
Nitrate plus nitrite nitrogen: Automated Cd reduction, Ion chromatography	June 91–Apr. 94 Automated Cd Reduction (0.01 mg/L)	—	Apr.–June 94 Cd Reduction June 94–Present Ion C (0.01 mg/L)
NH_x: Automated salicylate	June 91–Feb. 94 (1 µg/L)	—	Feb. 94–Present (1 µg/L)
Dissolved silicate silica: Automated/molybdate	June 91–Feb. 94 (0.01 mg/L)	—	Mar. 94–Present (0.01 mg/L)
SO_4: Ion chromatography	—	—	Jan. 94–Present (0.1 mg/L)
Dissolved chloride: Automated Ferro-cyanide, Ion chromatography	June 91–June 94 Automated FeCN (0.1 mg/L)	—	June 94–Present IC (0.1 mg/L)
Dissolved calcium: Ion chromatography	—	—	Jan. 94–Present (0.1 mg/L)
Dissolved calcium: Atomic absorption	June 91–Oct. 93 (0.1 mg/L)	—	Oct. 93–1 Jan. 94 (0.1 mg/L)

Table C-2. Continued.

Parameter and method	Laboratory		
	WES–Vicksburg	WES–Eau Galle	UMESC[a]
Dissolved magnesium: Ion chromatography			Jan. 94–Present (0.1 mg/L)
Dissolved sodium: Ion chromatography			Jan. 94–Present (0.1 mg/L)
Dissolved potassium: Atomic absorption	June 91–Oct. 93 (0.1 mg/L)	—	Oct. 93–Present (0.1 mg/L)
Dissolved iron: Atomic absorption	June 91–Apr. 93 (0.01 mg/L)	—	—
Dissolved manganese: Atomic absorption	June 91–Apr. 93 (0.01 mg/L)	—	—

[a]Upper Midwest Environmental Sciences Center

Appendix D. Water Quality Sample Collection

Details of sample collection are important to ensure that field activities comply with the monitoring design and are producing unbiased results. The figures in Appendix D focus on site visits and sample collection times. Consistent differences in sampling times among sites, over time, or among field stations can introduce serious bias into measurements influenced by daily cycles (e.g., temperature and dissolved oxygen). Gaps in the data record can also have important ramifications for data interpretation and are therefore documented here.

Table D-1. Fixed-site sampling visit exceptions from 1993 through 1996 at the Pool 26 Field Station. Table entries are keyed to numbered points on Figure D-1.

Figure code	Begin date	Site visits	Comment
1	07/12/93	0	1993 flood–no traffic allowed on River
2	10/25/93	0	Sampling crew misunderstood revised sampling protocol
3	01/03/94	8	Extreme cold–unsafe to sample
4	01/17/94	6	Extreme cold–unsafe to sample
5	01/31/94	0	Sampling crew misunderstood revised sampling protocol
6	04/25/94	0	Sampling crew misunderstood revised sampling protocol
7	05/16/94	2	Sampling for training only
8	08/01/94	0	Sampling crew misunderstood revised sampling protocol
9	10/17/94	1	Site sampled late (Sunday)
10	11/21/94	0	Lack of personnel to sample
11	02/06/95	9	Unsafe ice conditions
12	05/29/95	1	Could not access most sites because of flooding
13	06/05/95	1	Could not access most sites because of flooding
14	02/05/96	9	Unsafe ice conditions
15	12/23/96	0	Lack of personnel to sample
16	12/30/96	10	Unsafe ice conditions

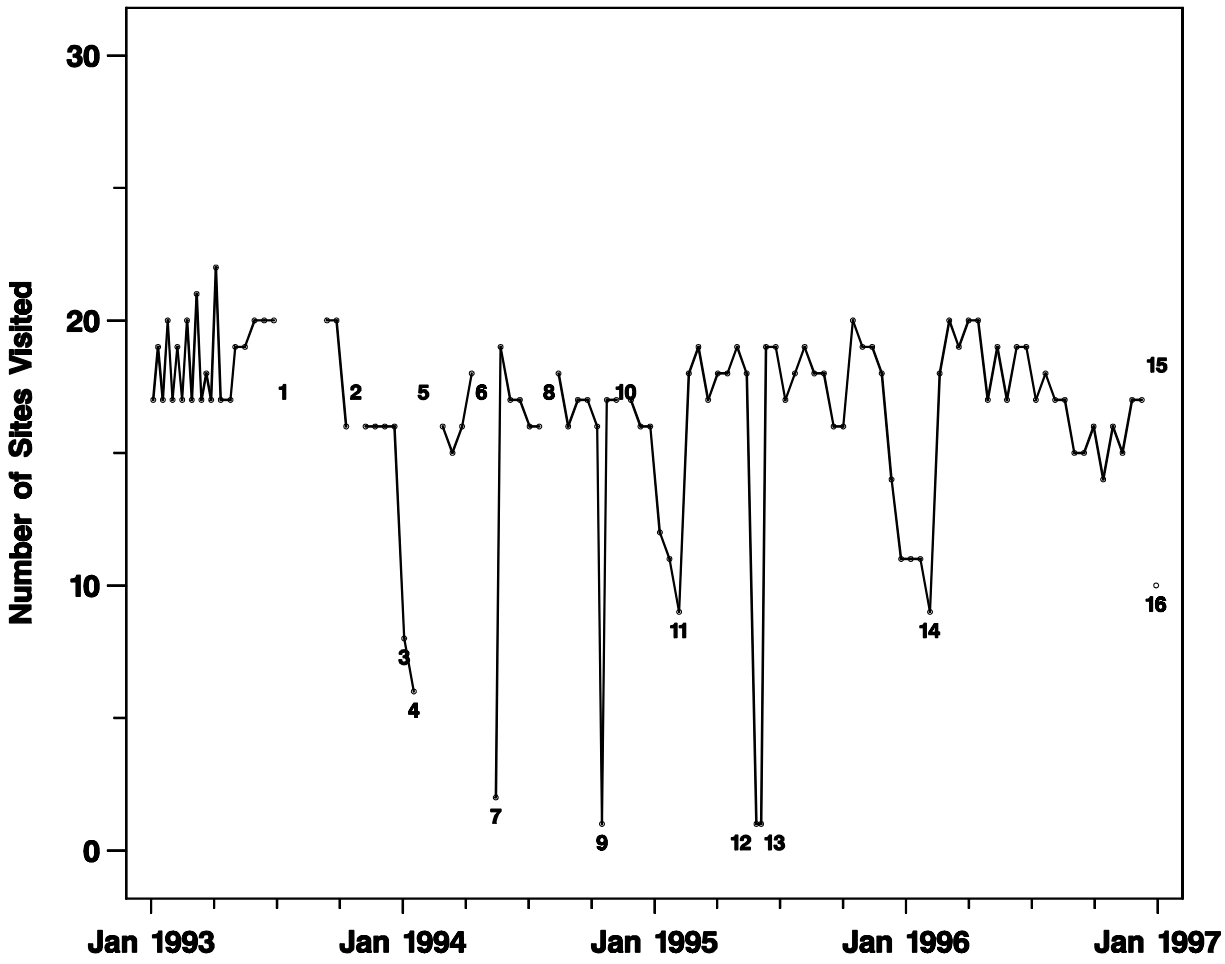

Figure D-1. Number of weekly fixed-site visits from January 1993 through December 1996 by the Pool 26 Field Station. Numbered points are weeks that differ by more than one standard deviation from the mean site visits per week and are described in Table D-1.

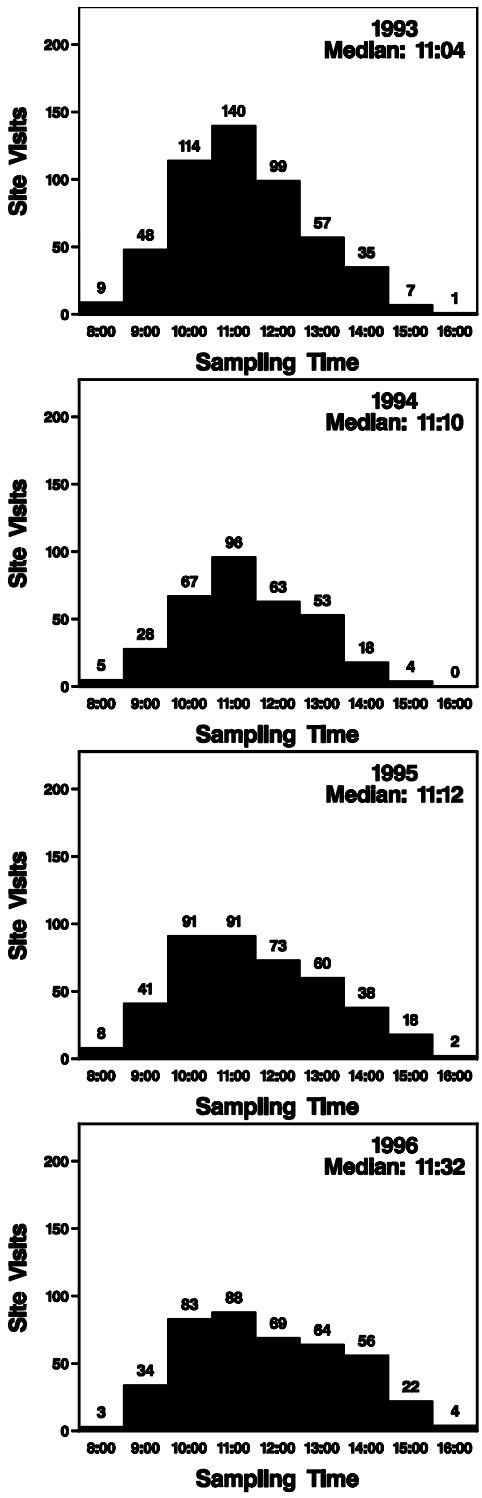

Figure D-2. Distribution of sample collection times at fixed sites from 1993 through 1996. Each bar is labeled with the number of site visits within each hourly interval.

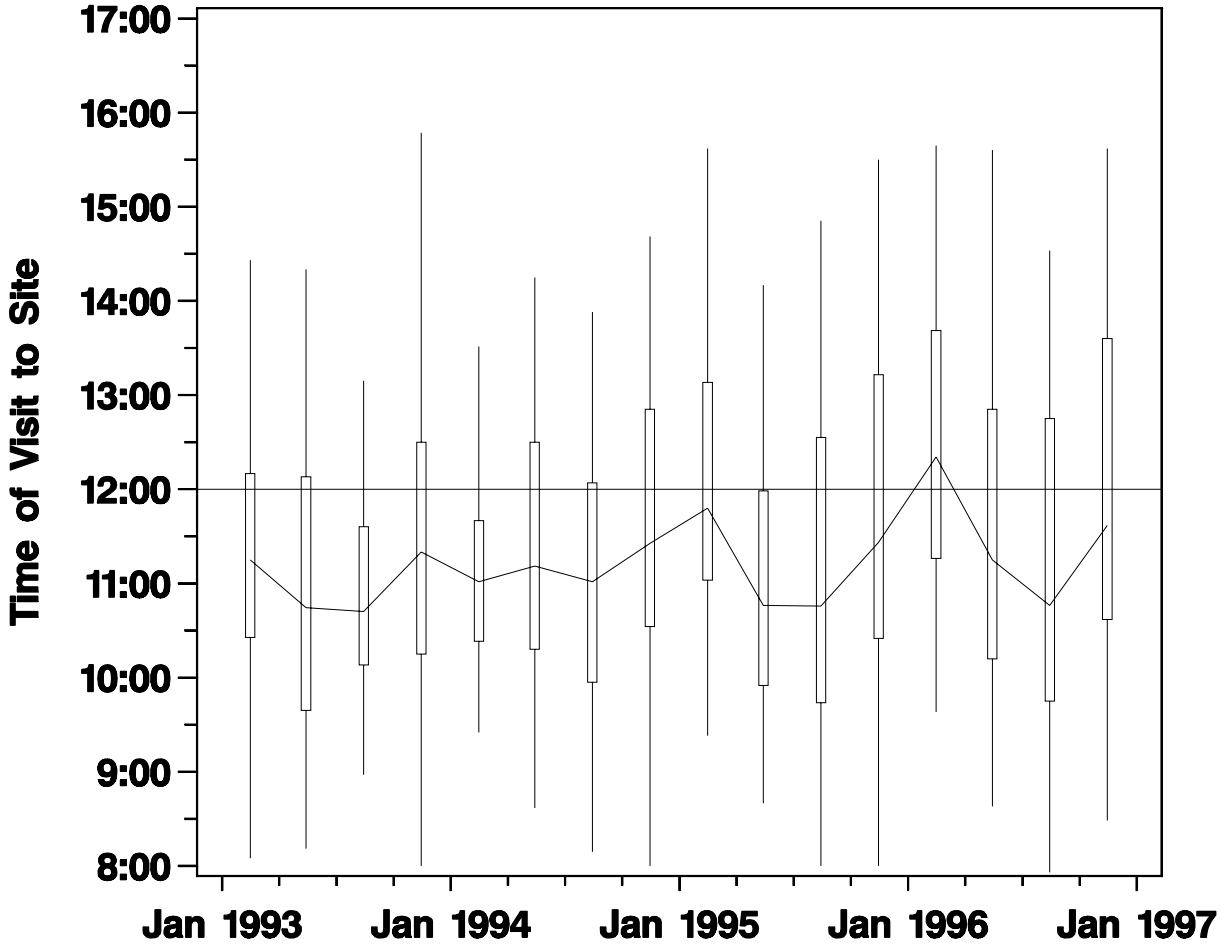

Figure D-3. Trend in fixed-site sample collection times by quarter, from 1993 through 1996. The midpoint (median) for each quarter is joined by a solid line. The box extending above and below the median denotes the 90th and 10th percentiles, respectively. The vertical line extends above and below the box to the maximum and minimum values for the quarter.

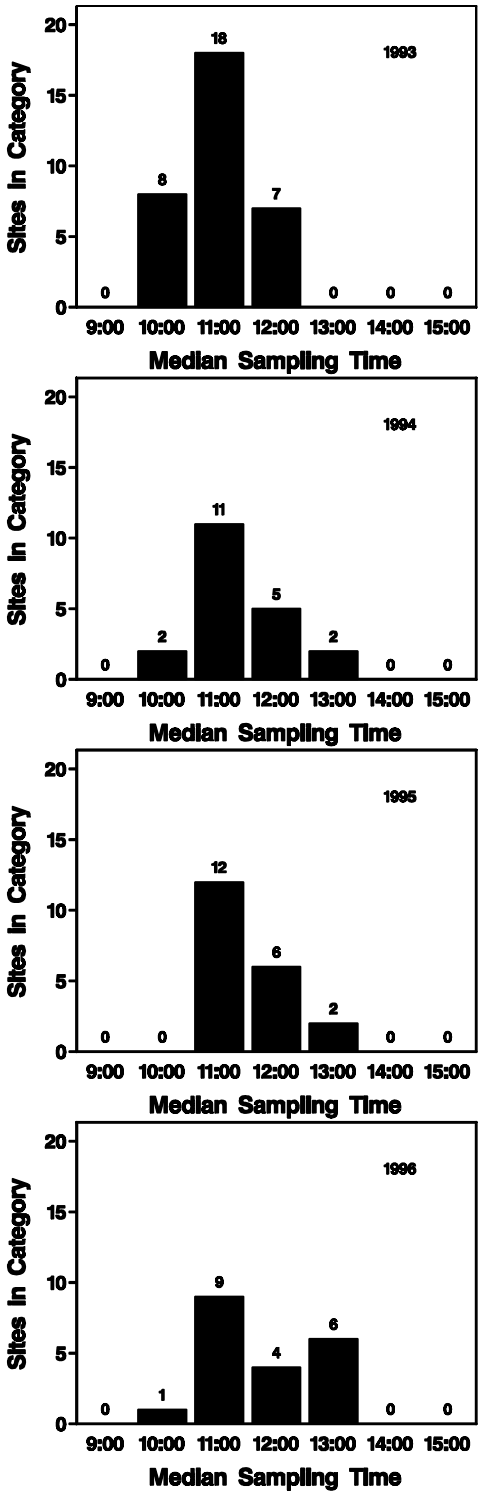

Figure D-4. Distribution of fixed sites by median sampling time at each site from 1993 through 1996.

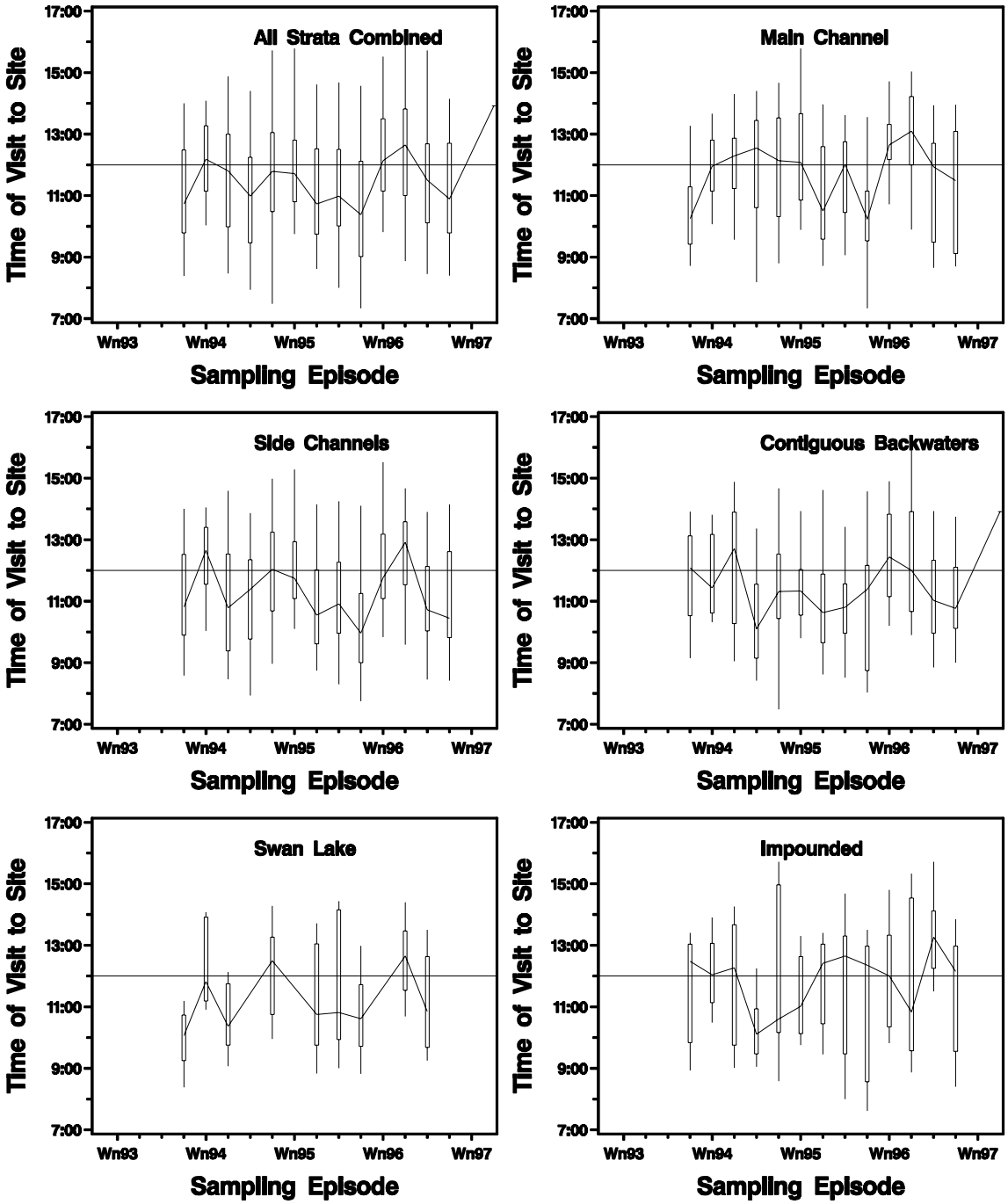

Figure D-5. Water quality sample collection times in each sampling stratum during each episode of stratified random sampling from 1993 through 1996. The midpoints (median) of the episodes are joined by a solid line. The box extending above and below the median denotes the 90th and 10th percentiles, respectively. The vertical line extends above and below each box to the maximum and minimum values for the episode.

Appendix E. Fixed-site Sampling Data: January 1993–December 1996

In Appendix E, we summarize the fixed-site monitoring data in both tabular and graphic forms. The tables contain annual statistics for each fixed site divided into two parameter groups: (1) physical and biological measurements (Table E-1), and (2) chemical data (major anions, cations, and plant nutrients; Table E-2). Within each parameter group, the data are divided by sampling depth into three groups (surface, middepth, and bottom). Chemical measurements are typically collected only at the surface and near the bottom. The majority of all measurement are in the near-surface category. Refer to Appendix A for descriptions and locations of the individual sampling sites. Sites with less than five visits during the 1993–96 period are excluded from these summaries.

The figures (E-1 and E-2) of the fixed-site data are in two formats. For sampling on the Mississippi (or Illinois) River main stems, the figures generally include separate plots of monthly means from main channel and impounded sites near the upstream and downstream ends of the reach or pool (where available). For tributary sampling, only a single plot is provided. Unlike the summary tables, these figures combine data from all sampling depths.

Data that have been flagged as questionable in the Long Term Resource Monitoring Program database are excluded from this summary. Values that are below detection are indicated by the detection limit preceded by a negative sign. Below-detection values are included in the determination of minima, maxima, and medians, but in the calculation of means and standard deviations, values below detection have been replaced by a value equal to half the detection limit. The Secchi transparency data in this report do not include observations where Secchi transparency exceeded the water column depth. High transparency conditions are thus under represented.

Table E-1. Annual summaries (1993–1996) of physical measurements at fixed sites grouped into four categories: near-surface (less than or equal to 0.2 m below the surface), middepth, near bottom (less than or equal to 0.2 m above the substrate), and miscellaneous depths.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements:																			
BC04.6M	Mean	0.2	1.32	—	—	—	—	—	13.3	8.84	83	458	7.8	—	14	13.4	3	1.72	—
	Median	0.2	1.4	—	—	—	—	—	13.1	8.5	84	454	7.8	—	14	12.6	2.7	2.67	—
	Minimum	0.2	0.3	—	—	—	—	—	5.3	7	72	254	7.2	—	10	5.7	-0.1	-1	—
	Maximum	0.2	2.5	—	—	—	—	—	24	11.4	93	655	8.2	—	19	27.4	6.3	3.49	—
	Std. dev.	0	0.87	—	—	—	—	—	6.76	1.56	5.55	109	0.29	—	2.83	6.51	1.89	2.39	—
	N obs.	11	11	0	0	0	0	0	11	11	11	11	10	0	11	9	9	3	0
CA00.4M	Mean	0.2	4.92	0	—	—	—	—	15.2	9.1	88	512	8	43.8	29	28.6	6.3	10.1	—
	Median	0.2	5.35	0	—	—	—	—	17.6	8.35	87	493	8.1	36	25	27.6	5.6	10.1	—
	Minimum	0.2	1.5	0	—	—	—	—	2	6.2	69	186	7.6	21	15	5.7	3.1	7.48	—
	Maximum	0.2	8.5	0	—	—	—	—	26.5	12.7	121	762	8.5	100	77	60.4	10.6	12.8	—
	Std. dev.	0	2.63	0	—	—	—	—	8.08	2.36	14.2	154	0.22	21.6	16.7	17.2	2.67	3.73	—
	N obs.	12	12	2	0	0	0	0	12	12	12	12	12	12	12	10	10	2	0
CU11.6M	Mean	0.2	6.3	0	—	—	—	—	14.7	8.03	77	283	7.5	40	61	65.1	9.2	6.22	—
	Median	0.2	6.3	0	—	—	—	—	15.1	8.05	75	243	7.5	40	54	53.9	9	4.49	—
	Minimum	0.2	6.3	0	—	—	—	—	6	3.7	46	115	7.2	40	10	10.7	4.8	2.25	—
	Maximum	0.2	6.3	0	—	—	—	—	25.8	11.2	106	582	8.2	40	111	190	16.8	11.9	—
	Std. dev.	0	—	—	—	—	—	—	7.41	2.09	15.8	134	0.28	—	36.4	57	3.82	5.07	—
	N obs.	12	1	1	0	0	0	0	12	12	12	12	10	1	12	10	10	3	0
DC01.0M	Mean	0.2	2.57	—	—	—	—	—	13.1	7.36	67	341	7.7	—	56	71.7	10.5	—	—
	Median	0.2	2	—	—	—	—	—	9.3	8	72	319	7.7	—	46	50.8	10	—	—
	Minimum	0.2	1.3	—	—	—	—	—	6.8	3.4	41	210	7	—	26	18.7	5.6	—	—
	Maximum	0.2	4.9	—	—	—	—	—	24	10.4	85	544	8.4	—	88	185	17.2	—	—
	Std. dev.	0	1.37	—	—	—	—	—	7.1	2.43	16	107	0.48	—	24.7	62.9	4.64	—	—
	N obs.	7	7	0	0	0	0	0	7	7	7	7	6	0	7	6	6	0	0
I005.7M	Mean	0.2	2.07	0.08	70.8	7	16	0	11	10.1	89	584	8.1	36.3	40	49.8	9	19.5	—
	Median	0.2	1.4	0.08	90	7	0	0	10	9.8	88	592	8.1	36	36	28.1	6.2	7.61	—
	Minimum	0.2	0.51	0	5	3	0	0	0.3	5.5	68	301	7.7	8	18	11.6	2.5	-1	—
	Maximum	0.2	4.6	0.31	98	12	65	0	26.9	15	133	796	8.7	60	128	211	25.5	84.6	—
	Std. dev.	0	1.27	0.1	44.2	4.21	32.5	.15	8.64	2.83	14.1	107	0.3	12.2	24.2	60.2	6.95	29.5	—
	N obs.	21	21	19	4	4	4	4	21	20	20	21	21	21	21	10	10	8	0
I005.8K	Mean	0.2	1.76	0.07	85	3	0	0	5.83	12.4	99	595	8.2	35.9	45	—	—	—	—
	Median	0.2	1.3	0	85	3	0	0	3.8	12	90	595	8.1	38	30	—	—	—	—
	Minimum	0.2	0.55	0	75	3	0	0	0.1	8.6	82	454	7.7	11	13	—	—	—	—
	Maximum	0.2	4.7	0.24	95	5	0	0	15.2	17.2	148	784	8.7	57	151	—	—	—	—
	Std. dev.	0	1.27	0.1	10	1.44	0	0	4.94	2.54	21.1	90.1	0.33	13.9	42.1	—	—	—	—
	N obs.	13	12	10	3	3	3	3	12	11	11	12	12	12	12	0	0	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements:																			
I007.0W	Mean	0.2	2.34	0.4	40.3	2	0	0	9.01	10.3	85	619	8.1	26.9	73	68.5	8.6	5.48	—
	Median	0.2	1.85	0.47	45	1	0	0	5.95	11	88	609	8.1	26.5	49	64.3	7.7	3.74	—
	Minimum	0.2	0.6	0.1	1	1	0	0	0.2	4.4	55	379	7.3	6	24	16.2	2.3	-1	—
	Maximum	0.2	6.71	0.7	75	3	0	0	26.3	14.2	103	1059	9.4	59	320	232	25	23.5	—
	Std. dev.	0	1.52	0.16	37.2	0.87	0	0	8.24	2.98	12.7	144	0.43	12.1	65.8	54.7	5.56	6.01	—
	N obs.	28	28	21	3	3	3	3	28	28	28	28	27	28	28	13	13	13	0
M193.2F	Mean	0.2	12.1	—	—	—	—	—	15.8	8.49	83	442	8	14.1	226	214	23.7	8.93	—
	Median	0.2	11.6	—	—	—	—	—	17.4	7.65	80	460	8	10	201	139	17	6.55	—
	Minimum	0.2	9.2	—	—	—	—	—	4.4	6	69	273	7.2	3	33	36.4	6.5	-1	—
	Maximum	0.2	15	—	—	—	—	—	25.5	12.2	98	541	8.2	33	600	641	63.3	27.1	—
	Std. dev.	0	1.99	—	—	—	—	—	7.28	2.42	11	87.6	0.26	10.5	185	195	18.1	8.58	—
	N obs.	12	11	0	0	0	0	0	12	12	12	12	12	12	12	10	10	9	0
M196.9Q	Mean	0.2	7.87	—	—	—	—	—	14.6	9.63	90	404	8.2	29.2	72	75.8	12.4	20.2	—
	Median	0.2	7.6	—	—	—	—	—	16.3	8.15	84	410	8.2	28	52	74.4	10.2	12.2	—
	Minimum	0.2	4.5	—	—	—	—	—	2.5	6.2	74	293	7.2	7	12	16	6.6	4.68	—
	Maximum	0.2	12.2	—	—	—	—	—	25.5	15.9	131	527	8.6	67	210	179	24.7	75.6	—
	Std. dev.	0	2.65	—	—	—	—	—	7.67	3.44	17.2	74.1	0.35	17.2	62.4	49.7	5.89	23.2	—
	N obs.	12	11	0	0	0	0	0	12	12	12	12	12	12	12	10	10	10	0
M201.7Q	Mean	0.2	4.86	0.1	—	—	—	—	14.8	9.78	93	371	8	35.6	43	38.6	9.1	21.5	—
	Median	0.2	4.35	0.06	—	—	—	—	16.4	8.6	88	405	8.2	33	37	25.9	7.5	19	—
	Minimum	0.2	3.7	0	—	—	—	—	4	6.8	81	258	7.2	17	12	19.9	5.6	1.97	—
	Maximum	0.2	7.4	0.24	—	—	—	—	26.8	14.5	115	492	8.6	65	160	121	22.9	53.1	—
	Std. dev.	0	1.15	0.12	—	—	—	—	8.53	3.01	12.5	82.8	0.48	13.9	42.5	31.6	5.32	15.8	—
	N obs.	10	10	3	0	0	0	0	10	10	10	10	10	10	10	9	9	8	0
M202.2N	Mean	0.2	2.26	0.03	25	3	0	0	10.4	11.3	97	414	8.1	35.9	40	38.5	9.1	26	—
	Median	0.2	1.92	0	25	3	0	0	7.3	10.7	96	424	8.1	39	30	28.7	8	23	—
	Minimum	0.2	0.95	0	15	2	0	0	1.7	6.3	76	282	7.1	12	15	20.5	4.2	2.49	—
	Maximum	0.2	5.8	0.12	35	4	0	0	26.8	17.4	133	544	8.9	75	193	103	19.4	65.1	—
	Std. dev.	0	1.13	0.04	14.1	1.41	0	0	7.8	3.43	17	78.5	0.39	14	34.8	24.8	4.51	18.7	—
	N obs.	25	25	16	2	2	2	2	25	25	25	25	25	25	25	10	10	10	0
M202.2R	Mean	0.2	1.75	0.02	83.3	3	0	0	4.96	13.1	102	433	8.2	37.9	37	23.5	6.2	36.4	—
	Median	0.2	1.47	0	85	3	0	0	3	13.2	98	404	8	32	36	22.2	5.3	13.2	—
	Minimum	0.2	0.3	0	75	2	0	0	1.2	9.2	80	333	7.6	22	12	17.8	4.7	2.03	—
	Maximum	0.2	4.6	0.09	90	3	0	0	12.8	17.6	134	534	9	79	65	30.4	8.5	93.9	—
	Std. dev.	0	1.19	0.04	7.64	0.58	0	0	3.91	2.38	14.8	83.7	0.39	17.3	19.3	6.39	2.04	50.2	—
	N obs.	13	13	12	3	3	3	3	13	13	13	13	13	12	13	3	3	3	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements:																			
M202.2V	Mean	0.2	6.9	0.71	38.5	8	38	1	3.34	12.6	93	448	7.9	25.8	104	68	9.1	—	—
	Median	0.2	6.55	0.6	38.5	8	38	1	1.95	12.7	95	465	7.9	20.5	78	48.6	9.9	—	—
	Minimum	0.2	4	0.3	2	5	0	0	0	8.9	83	309	7.7	4	19	9.6	3.5	—	—
	Maximum	0.2	10.8	1.7	75	12	75	1	12.3	14.9	105	580	8.4	74	337	146	14	—	—
	Std. dev.	0	1.68	0.35	51.6	5.3	53	.71	3.62	1.81	6.64	98.2	0.2	18	96.8	70.2	5.29	—	—
	N obs.	16	16	15	2	2	2	2	16	16	16	16	16	16	16	3	3	0	0
M203.5Q	Mean	0.2	1.14	0.09	70	2	0	0	6.96	10.6	85	370	8.1	19.6	101	104	12.1	—	—
	Median	0.2	1.09	0.08	70	2	0	0	8.1	10	82	328	8	19	76	104	12.1	—	—
	Minimum	0.2	0	0	70	2	0	0	0.2	8.5	79	310	7.8	13	40	104	12.1	—	—
	Maximum	0.2	2.7	0.22	70	2	0	0	13	14.6	100	554	8.6	25	167	104	12.1	—	—
	Std. dev.	0	0.96	0.1	—	—	—	—	5.21	2.46	8.72	103	0.29	4.67	54.8	—	—	—	—
	N obs.	6	6	5	1	1	1	1	5	5	5	5	5	5	5	1	1	0	0
M203.5R	Mean	0.2	1.55	0.19	40	1	0	0	14.3	8.28	78	399	8	24	85	72.8	11.1	7.33	—
	Median	0.2	1.8	0.23	40	1	0	0	14.8	7.9	81	402	8	19.5	77	61.4	11.2	4.92	—
	Minimum	0.2	0	0	40	1	0	0	1.8	0.2	2	295	7.8	12	15	24	3.5	3.74	—
	Maximum	0.2	3.3	0.4	40	1	0	0	26	17	122	574	8.4	42	210	115	19.3	15.7	—
	Std. dev.	0	0.98	0.12	—	—	—	—	7.54	3.86	26.8	79	0.21	10.5	54.9	40.7	5.96	5.64	—
	N obs.	12	13	12	1	1	1	1	12	12	12	12	12	12	12	5	5	4	0
M206.0S	Mean	0.2	1.97	0.13	40	5	0	0	11.5	10.8	99	397	8.3	31.1	52	47.7	9.9	9.49	—
	Median	0.2	1.2	0	45	5	0	0	11	9.55	92	388	8.3	31	34	40.4	8.8	7.03	—
	Minimum	0.2	0.4	0	5	5	0	0	2	5.8	74	298	7.8	12	20	12	4.1	2.67	—
	Maximum	0.2	9.7	0.83	70	6	0	0	27	18.4	146	638	9.4	56	187	112	20.5	16.4	—
	Std. dev.	0	2.19	0.25	32.8	0.5	0	0	8.17	3.54	23.6	79.5	0.45	12.2	39.6	34.2	5.83	6.22	—
	N obs.	19	19	19	3	3	3	3	19	16	16	19	19	19	19	6	6	5	0
M206.1T	Mean	0.2	1.88	0.12	—	—	—	—	16.5	9.59	96	367	8	38.9	49	46.3	9.7	8.46	—
	Median	0.2	1.8	0	—	—	—	—	17.1	8.7	88	390	8	36	32	35.4	8.3	5.7	—
	Minimum	0.2	0.5	0	—	—	—	—	7	6.4	73	304	7.5	12	10	18.4	4	4.99	—
	Maximum	0.2	3.3	0.54	—	—	—	—	27.1	15.2	133	422	8.8	64	173	117	18.1	17.5	—
	Std. dev.	0	0.84	0.2	—	—	—	—	7.3	2.98	21.6	52	0.34	18.1	49.8	35.4	4.87	6.02	—
	N obs.	9	9	9	0	0	0	0	9	9	9	9	9	9	9	6	6	4	0
M211.2P	Mean	0.2	2.52	0.26	51.7	11	0	0	3.8	12.3	92	426	8	25.3	86	—	—	—	—
	Median	0.2	1.7	0.21	60	7	0	0	2	12.2	92	410	7.9	20	64	—	—	—	—
	Minimum	0.2	1.03	0.09	30	6	0	0	0.2	8.4	80	309	7.5	3	22	—	—	—	—
	Maximum	0.2	8.04	0.64	65	21	0	0	13	15	105	577	8.8	63	250	—	—	—	—
	Std. dev.	0	2.05	0.14	18.9	8.39	0	0	3.81	1.8	7.27	94.6	0.38	16.5	61.7	—	—	—	—
	N obs.	16	15	13	3	3	3	3	15	15	15	15	14	15	15	0	0	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements:																			
M212.4X	Mean	0.2	4.98	1.17	33.3	7	0	0	4.15	11.5	88	624	7.9	20.3	85	150	13.7	6.81	—
	Median	0.2	4.6	1.23	40	4	0	0	2.75	11.9	89	613	8	19	79	42.6	5.7	7.14	—
	Minimum	0.2	3.3	0.56	5	3	0	0	0.2	8	73	466	7.5	6	34	30.7	5.3	3.87	—
	Maximum	0.2	9.1	1.58	55	15	0	0	13.8	14.6	103	804	8.4	36	191	378	30	9.43	—
	Std. dev.	0	1.41	0.28	25.7	6.79	0	0	4.27	1.58	7.34	89.8	0.28	8.65	42.4	197	14.1	2.79	—
	N obs.	16	15	16	3	3	3	3	16	16	16	16	15	16	16	3	3	3	0
M219.4U	Mean	0.2	5.09	0.77	41.4	3	3	0	2.89	13.2	97	474	7.9	31.1	85	—	—	—	—
	Median	0.2	3.91	0.41	60	3	0	0	1.2	13.7	97	543	7.9	27	50	—	—	—	—
	Minimum	0.2	2.18	0.19	2	2	0	0	0.1	9.7	85	326	7.5	6	14	—	—	—	—
	Maximum	0.2	13.2	1.7	80	7	15	0	13	16	112	617	8.4	64	280	—	—	—	—
	Std. dev.	0	3.13	0.58	35.6	1.89	6.71	.13	3.75	1.79	7.51	108	0.27	16.2	76.1	—	—	—	—
	N obs.	16	14	16	5	5	5	5	16	16	16	16	16	16	16	0	0	0	0
M224.2S	Mean	0.2	2.73	0.25	47.5	5	6	0	2.99	12.8	94	463	7.9	28.6	93	—	—	—	—
	Median	0.2	2.99	0.24	50	5	0	0	1.35	12.9	95	506	7.9	24.5	67	—	—	—	—
	Minimum	0.2	0.62	0.05	10	2	0	0	0.2	9.7	82	311	7.4	8	19	—	—	—	—
	Maximum	0.2	8.23	0.49	80	10	20	1	13	14.9	104	607	8.3	60	333	—	—	—	—
	Std. dev.	0	2	0.14	30.3	3.46	9.17	0.2	3.71	1.62	7.06	108	0.23	17.3	83	—	—	—	—
	N obs.	16	15	16	6	6	6	6	16	16	16	16	16	16	16	0	0	0	0
M235.5D	Mean	0.2	2.98	0.12	100	1	0	0	12.9	8.92	82	345	8	31	55	52.4	9.6	19.9	—
	Median	0.2	3.4	0.16	100	1	0	0	10	8.4	79	379	8	28	42	42.8	8.1	15.7	—
	Minimum	0.2	1	0	100	1	0	0	3.9	6	65	223	7.2	9	23	17.8	2.6	2.81	—
	Maximum	0.2	4.9	0.26	100	1	0	0	24.6	12.1	107	445	9	52	200	145	22.3	55.4	—
	Std. dev.	0	1.36	0.11	—	—	—	—	7.6	1.99	10.9	86.9	0.55	10.7	45.3	40.4	5.98	17.9	—
	N obs.	13	13	11	1	1	1	1	13	13	13	13	11	13	13	8	8	8	0
M235.6J	Mean	0.2	3.73	0.64	4.75	3	0	0	3.06	13.3	98	478	8	34.8	85	—	—	—	—
	Median	0.2	3.07	0.57	5	3	0	0	1.45	13.5	98	543	8	32	50	—	—	—	—
	Minimum	0.2	1.7	0.26	3	1	0	0	0.2	9.9	90	326	7.3	7	11	—	—	—	—
	Maximum	0.2	7.93	1.33	6	7	0	0	12.9	15.7	110	613	8.5	72	333	—	—	—	—
	Std. dev.	0	1.89	0.3	1.26	2.56	0	0	3.7	1.61	5.71	108	0.3	20.1	89	—	—	—	—
	N obs.	16	16	16	4	4	4	4	16	16	16	16	15	16	16	0	0	0	0
M237.2G	Mean	0.2	3.87	0.6	—	—	—	—	9.97	10.8	92	396	8.2	28	161	76.5	12.4	24	—
	Median	0.2	4	0.71	—	—	—	—	7.7	11.9	92	392	8	22	65	78.9	11.7	13.8	—
	Minimum	0.2	1.5	0	—	—	—	—	0.9	6.6	77	194	7.5	2	11	11.4	4.7	5.35	—
	Maximum	0.2	6.4	1.03	—	—	—	—	24.8	15	121	607	10	80	1985	183	26.2	92.8	—
	Std. dev.	0	1.59	0.37	—	—	—	—	7.91	2.61	10.3	92.8	0.64	18.1	412	54.7	5.74	25.6	—
	N obs.	23	23	22	0	0	0	0	23	23	23	23	21	23	22	12	12	12	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements:																			
M237.4T	Mean	0.2	3.69	0.65	21.6	4	16	0	3.09	12.7	94	460	7.9	29.9	84	—	—	—	—
	Median	0.2	3.07	0.54	10	3	0	0	1.65	13.2	95	486	7.9	24.5	62	—	—	—	—
	Minimum	0.2	1.6	0.07	3	1	0	0	0.2	9.6	83	316	7.5	6	15	—	—	—	—
	Maximum	0.2	6.1	1.39	80	9	80	1	13	14.7	106	603	8.4	63	241	—	—	—	—
	Std. dev.	0	1.53	0.42	32.8	3.42	35.8	.45	3.72	1.42	6.06	95.2	0.26	17.3	72.7	—	—	—	—
	N obs.	16	15	16	5	5	5	5	16	16	16	16	15	16	15	0	0	0	0
M241.4K	Mean	0.2	7.79	0.19	29.5	3	0	0	8.05	12	97	456	8.1	32.9	59	74.3	12.1	30.1	—
	Median	0.2	7.8	0.15	10.5	2	0	0	3.5	12.3	98	449	8.1	25	53	64.7	13	17.8	—
	Minimum	0.2	1.5	0.05	2	1	0	0	0.3	6.6	81	294	7.6	9	9	14	5.1	6.24	—
	Maximum	0.2	14.6	0.44	95	7	0	0	25.1	15.8	120	612	9.3	67	210	208	26.1	140	—
	Std. dev.	0	3.27	0.13	44	2.84	0	0	8.41	2.98	9.74	99.2	0.4	18.7	48.3	57.8	5.75	35.2	—
	N obs.	27	27	15	4	4	4	4	27	27	27	27	25	27	26	13	13	13	0
MO02.0X	Mean	0.2	9.65	1.77	—	—	—	—	15.6	8.44	82	435	7.9	13.3	245	207	21.5	5.03	—
	Median	0.2	8.8	1.77	—	—	—	—	17.2	8.1	84	461	8	10	217	146	19.1	4.87	—
	Minimum	0.2	6.1	1.39	—	—	—	—	4	5.9	69	274	7.1	4	37	32.9	6.5	-1	—
	Maximum	0.2	14.3	2.15	—	—	—	—	25.1	12	95	543	8.2	29	530	555	54.6	9.36	—
	Std. dev.	0	2.95	0.54	—	—	—	—	7.28	2.28	9.19	98.7	0.28	9.61	188	179	14.9	3.31	—
	N obs.	12	11	2	0	0	0	0	12	12	12	12	12	12	12	10	10	8	0
PE01.8M	Mean	0.2	2.49	—	—	—	—	—	12	8.21	74	298	7.6	56	46	41.8	7	11	—
	Median	0.2	2.2	—	—	—	—	—	9.2	8.4	74	329	7.7	56	38	34.6	6.9	11	—
	Minimum	0.2	1.4	—	—	—	—	—	6	4.4	48	152	7.2	56	17	11.9	2.7	11	—
	Maximum	0.2	4.6	—	—	—	—	—	19.9	11.2	90	395	7.9	56	77	113	14.8	11	—
	Std. dev.	0	1.14	—	—	—	—	—	5.8	2.39	15.4	85.2	0.27	—	21.9	37.2	4.38	—	—
	N obs.	7	7	0	0	0	0	0	7	7	7	7	6	1	7	6	6	1	0
PI00.2M	Mean	0.2	4.52	0.05	—	—	—	—	15.7	7.4	72	514	8	51.5	29	27.9	6	13.2	—
	Median	0.2	4.9	0	—	—	—	—	17.1	6.8	74	496	8	42	27	34.6	6.5	15.7	—
	Minimum	0.2	2.4	0	—	—	—	—	5.9	3.9	44	293	7.6	17	7	6.1	2.2	2.25	—
	Maximum	0.2	6.4	0.14	—	—	—	—	27	11.7	96	804	8.7	125	78	55.9	13.7	19.1	—
	Std. dev.	0	1.44	0.08	—	—	—	—	7.34	2.21	12.4	133	0.27	33.1	19.6	17.1	3.62	7.49	—
	N obs.	12	11	3	0	0	0	0	12	12	12	12	11	11	12	9	9	4	0
WD00.2M	Mean	0.2	4.79	0.02	—	—	—	—	15.1	8.07	78	554	8	48.8	50	32.3	5.7	6.75	—
	Median	0.2	4.92	0.02	—	—	—	—	16.3	8	81	522	8	42	26	33.2	5	6.75	—
	Minimum	0.2	1.3	0	—	—	—	—	2.1	2.6	26	248	7.3	9	6	13.5	2.6	6.01	—
	Maximum	0.2	8.5	0.04	—	—	—	—	26	12.6	113	909	8.4	160	290	61	9.8	7.48	—
	Std. dev.	0	2.59	0.03	—	—	—	—	7.54	2.91	22	204	0.29	39.5	77.9	14.1	2.62	1.04	—
	N obs.	12	12	2	0	0	0	0	12	12	12	12	12	12	12	10	10	2	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-bottom measurements:																			
M202.2N	Mean	2.36	2.57	0	—	—	—	—	8.27	12.4	102	458	8.4	—	33	—	—	—	—
	Median	1.9	2.1	0	—	—	—	—	6	12.7	98	492	8.1	—	27	—	—	—	—
	Minimum	1.1	1.3	0	—	—	—	—	2.8	7.6	77	381	8	—	21	—	—	—	—
	Maximum	5.6	5.8	0	—	—	—	—	17.2	17.3	128	500	9.1	—	50	—	—	—	—
	Std. dev.	1.54	1.53	0	—	—	—	—	5.64	4.04	22.2	66.5	0.62	—	15.3	—	—	—	—
	N obs.	7	7	2	—	—	—	—	7	7	7	3	3	—	3	0	0	0	0
M235.5D	Mean	2.01	2.22	0	—	—	—	—	8.23	9.91	84	284	—	—	53	—	—	—	—
	Median	1.9	2.17	0	—	—	—	—	8	10.4	83	298	—	—	53	—	—	—	—
	Minimum	0.8	1	0	—	—	—	—	3.8	7.6	60	225	—	—	53	—	—	—	—
	Maximum	3.4	3.6	0	—	—	—	—	17.1	12	106	330	—	—	53	—	—	—	—
	Std. dev.	1.08	1.08	0	—	—	—	—	4.41	1.72	14.5	53.8	—	—	—	—	—	—	—
	N obs.	7	7	2	—	—	—	—	7	7	7	3	0	—	1	0	0	0	0
M237.2G	Mean	2.3	2.5	0.4	—	—	—	—	7.39	11.9	97	348	7.7	—	1035	—	—	—	—
	Median	1.95	2.15	0.4	—	—	—	—	6.25	12.6	96	307	7.7	—	1035	—	—	—	—
	Minimum	1.3	1.5	0.09	—	—	—	—	1.4	7.9	81	207	7.6	—	24	—	—	—	—
	Maximum	4.6	4.8	0.71	—	—	—	—	17.6	14.8	119	529	7.9	—	2045	—	—	—	—
	Std. dev.	1.09	1.09	0.44	—	—	—	—	5.78	2.51	12.4	165	0.25	—	1429	—	—	—	—
	N obs.	8	8	2	—	—	—	—	8	8	8	3	2	—	2	0	0	0	0
M241.4K	Mean	4.98	5.21	0.13	—	—	—	—	2.73	13.8	101	472	8	—	56	—	—	—	—
	Median	5.55	5.79	0.03	—	—	—	—	1.8	13.7	99	545	7.9	—	55	—	—	—	—
	Minimum	1.3	1.5	0.01	—	—	—	—	0.6	11.3	96	317	7.7	—	19	—	—	—	—
	Maximum	7.6	7.8	0.34	—	—	—	—	8.1	15.7	109	599	8.3	—	95	—	—	—	—
	Std. dev.	2.54	2.53	0.19	—	—	—	—	2.82	1.49	6.14	131	0.3	—	31.4	—	—	—	—
	N obs.	6	6	3	—	—	—	—	6	6	6	5	3	—	4	0	0	0	0
PI00.2M	Mean	3.82	4.02	—	—	—	—	—	11.6	7.42	65	657	7.9	—	53	64.5	9.1	17.1	—
	Median	3.05	3.25	—	—	—	—	—	11	8	71	657	7.9	—	53	64.5	9.1	17.1	—
	Minimum	2.2	2.4	—	—	—	—	—	5.7	2.2	24	657	7.9	—	53	64.5	9.1	17.1	—
	Maximum	6.2	6.4	—	—	—	—	—	19	11.2	92	657	7.9	—	53	64.5	9.1	17.1	—
	Std. dev.	1.76	1.76	—	—	—	—	—	5.51	3.23	23.5	—	—	—	—	—	—	—	—
	N obs.	6	6	0	—	—	—	—	6	6	6	1	1	—	1	1	1	1	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements:																			
CA00.4M	Mean	0.2	2.3	—	5	4	0	0	15.9	9.93	97	565	8.1	30.4	64	77.5	13.6	—	—
	Median	0.2	2	—	5	4	0	0	15.3	9.55	93	617	8.1	25	38	46.8	10.3	—	—
	Minimum	0.2	0.9	—	5	4	0	0	1	4.8	63	233	7.7	6	9	7.1	2.3	—	—
	Maximum	0.2	6	—	5	4	0	0	29	14.8	177	750	8.6	80	410	608	70	—	—
	Std. dev.	0	1.33	—	—	—	—	—	9.67	3	25.5	135	0.26	20.4	88.3	128	14.8	—	—
	N obs.	20	20	0	1	1	1	1	20	20	20	20	18	19	20	20	20	0	0
CU11.6M	Mean	0.2	—	—	—	—	—	—	17.3	9.56	97	367	8.1	—	107	115	15	110	—
	Median	0.2	—	—	—	—	—	—	17.9	10.1	92	403	8.3	—	22	22.1	7.5	110	—
	Minimum	0.2	—	—	—	—	—	—	1.3	3.6	41	186	7.3	—	11	17.7	3.9	110	—
	Maximum	0.2	—	—	—	—	—	—	30	16.8	146	472	8.6	—	980	1488	119	110	—
	Std. dev.	0	—	—	—	—	—	—	9.47	3.13	27.5	96.9	0.4	—	236	354	27.2	—	—
	N obs.	17	0	0	0	0	0	0	17	17	17	16	8	0	17	17	17	1	0
DC01.0M	Mean	0.2	1.88	—	—	—	—	—	16.1	8.21	78	482	7.9	—	96	80	13.3	—	—
	Median	0.2	1.9	—	—	—	—	—	16.2	6.9	80	462	7.8	—	39	39	10.3	—	—
	Minimum	0.2	1.2	—	—	—	—	—	2	1.8	21	230	7.4	—	12	11.9	3.4	—	—
	Maximum	0.2	3.3	—	—	—	—	—	29	18.1	131	807	8.6	—	510	644	70.4	—	—
	Std. dev.	0	0.42	—	—	—	—	—	9.19	4	28.1	170	0.31	—	133	138	14.2	—	—
	N obs.	20	19	0	0	0	0	0	20	20	20	19	12	0	20	20	20	0	0
I005.7M	Mean	0.2	0.65	0	20	3	0	0	14	10.6	101	620	8.2	22.4	72	52.2	10.8	15	—
	Median	0.2	0.45	0	20	3	0	0	12.7	10.9	93	646	8	21.5	56	52.4	9.4	12.8	—
	Minimum	0.2	0.35	0	20	3	0	0	3.1	6.2	75	448	7.8	14	11	14.9	3.1	-1	—
	Maximum	0.2	2	0	20	3	0	0	26	16.2	185	714	9.1	37	240	90.1	27.4	33.9	—
	Std. dev.	0	0.52	0	—	—	—	—	8.91	3.23	33.4	90	0.44	7.23	67.2	24.9	6.84	11.7	—
	N obs.	9	9	9	1	1	1	1	9	9	9	9	8	8	9	9	9	9	0
I007.0W	Mean	0.2	1.21	0.17	—	—	—	—	17.5	7.47	73	627	8	27.1	67	68.1	10.7	25.1	—
	Median	0.2	1.1	0.12	—	—	—	—	20.5	7.3	77	645	8	29	40	46.6	9.2	13.9	—
	Minimum	0.2	0.6	0	—	—	—	—	2.5	3	39	385	7.5	14	22	21	3.7	5.85	—
	Maximum	0.2	2.1	0.58	—	—	—	—	31.2	13.6	105	753	8.2	44	460	352	38	225	—
	Std. dev.	0	0.45	0.17	—	—	—	—	9.28	3.22	17.6	97.5	0.17	7.24	97.1	74.4	7.27	48.6	—
	N obs.	19	19	14	0	0	0	0	19	19	19	19	16	19	19	19	19	19	0
M193.2F	Mean	0.2	7.5	—	3	7	0	0	16	9.56	93	543	8.2	22.1	120	190	24.3	19.4	—
	Median	0.2	6.8	—	3	7	0	0	17.2	9.65	93	562	8.2	21	64	95.4	13.8	12.7	—
	Minimum	0.2	4.6	—	3	7	0	0	0.6	5.6	73	256	7.9	5	20	17.3	5.1	-1	—
	Maximum	0.2	11.7	—	3	7	0	0	28.5	15.3	119	690	8.7	48	470	1145	113	48.8	—
	Std. dev.	0	1.98	—	—	—	—	—	9.7	2.44	11.5	126	0.24	11.7	132	262	25.7	14.2	—
	N obs.	20	20	0	1	1	1	1	20	20	20	20	17	20	19	20	20	20	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements:																			
M196.9Q	Mean	0.2	4.51	0.54	42.5	7	0	0	15.3	10.8	104	414	8.3	31.8	61	92.9	14.5	33.1	—
	Median	0.2	4.3	0.54	42.5	7	0	0	16.3	10.5	99	443	8.3	30.5	33	49.1	10.3	18.9	—
	Minimum	0.2	2.4	0.54	5	7	0	0	0.1	6.2	80	198	8	8	17	23.2	5.5	8.32	—
	Maximum	0.2	8.2	0.54	80	7	0	0	28	17.5	176	505	8.9	60	430	827	87.1	90.6	—
	Std. dev.	0	1.44	—	53	0	0	0	10.3	2.89	22.6	87.6	0.24	12.5	89.7	175	17.5	27.4	—
	N obs.	20	20	1	2	2	2	2	20	20	20	20	18	20	20	20	20	20	0
M201.7Q	Mean	0.2	4.19	0	100	23	100	5	16.1	11.5	115	387	8.5	36.8	41	41.2	10.5	39.2	—
	Median	0.2	4.4	0	100	23	100	5	15.9	10.6	102	415	8.4	34	30	31.6	9.5	35	—
	Minimum	0.2	1.9	0	100	23	100	5	0.9	6.2	74	143	7.9	8	8	9.2	3.9	13.8	—
	Maximum	0.2	5.5	0	100	23	100	5	31	17.2	217	472	9.2	80	250	240	37.8	101	—
	Std. dev.	0	0.87	0	—	—	—	—	10.2	3.27	34.1	84.4	0.36	16.5	51.1	49.3	7.24	22.8	—
	N obs.	20	20	17	1	1	1	1	20	20	20	19	16	19	20	20	20	20	0
M202.2N	Mean	0.2	1.97	0	100	16	99	20	16.4	11.2	113	395	8.5	37.7	42	43.7	11	43.5	—
	Median	0.2	2.1	0	100	16	99	20	16.5	10.7	101	410	8.5	35	30	35	9.2	29.6	—
	Minimum	0.2	0.4	0	100	16	99	20	1	5	57	143	8	9	9	9	4	5.24	—
	Maximum	0.2	2.6	0	100	16	99	20	31.1	17.1	204	474	9.1	68	240	222	37.6	189	—
	Std. dev.	0	0.58	0	—	—	—	—	10.1	3.54	40.6	74	0.33	16.2	49.2	46.2	7.3	41.5	—
	N obs.	20	20	18	1	1	1	1	20	20	20	19	17	20	20	20	20	20	0
M203.5R	Mean	0.2	0.9	0.02	80	12	50	2	17.1	11	113	412	8.5	29.6	51	64	11.9	32.6	—
	Median	0.2	0.65	0	80	12	50	2	17.9	10.4	104	429	8.4	30	35	41.7	9.1	24.5	—
	Minimum	0.2	0.41	0	60	3	0	0	0	6.7	78	201	8	9	9	9.3	3.9	8.02	—
	Maximum	0.2	5	0.07	100	20	100	3	32.6	15.6	183	632	9.3	56	250	245	40.5	88.4	—
	Std. dev.	0	1.1	0.03	28.3	12	70.7	2.1	10.2	2.75	29.3	88.2	0.37	11.6	56.1	60.5	8.88	23.3	—
	N obs.	16	16	15	2	2	2	2	16	16	16	16	14	15	16	16	16	16	0
M206.0S	Mean	0.2	1.14	0	95	12	50	3	18.5	11.8	124	389	8.7	27.1	59	59.8	15.7	65.7	—
	Median	0.2	1.05	0	95	12	50	3	19.5	11.4	120	405	8.7	25.5	38	43.2	14.5	61.6	—
	Minimum	0.2	0.67	0	90	4	0	0	1.5	6	70	140	8.2	10	16	8.8	5.7	22.5	—
	Maximum	0.2	2.5	0	100	19	100	5	33.5	20.7	179	464	9.5	61	310	237	38.7	122	—
	Std. dev.	0	0.4	0	7.07	10.6	70.7	3.5	10.3	3.74	34.4	73.5	0.31	12.1	68.6	53.5	8.51	30	—
	N obs.	17	17	16	2	2	2	2	17	17	17	16	15	16	17	17	17	17	0
M206.1T	Mean	0.2	0.75	0	100	21	100	5	21.8	7.3	84	425	8.1	16.6	84	84.7	20.9	50.9	—
	Median	0.2	0.68	0	100	21	100	5	23.1	8	76	445	8.2	16	67	72	19.6	53.2	—
	Minimum	0.2	0.45	0	100	21	100	5	0.9	3.8	48	141	7.4	10	16	13.4	6.9	30.6	—
	Maximum	0.2	2	0	100	21	100	5	34.2	9.2	132	519	8.5	24	250	202	33.5	79.8	—
	Std. dev.	0	0.43	0	—	—	—	—	9.47	1.68	25.3	109	0.35	4.9	61.6	48.6	7.97	17.4	—
	N obs.	11	11	8	1	1	1	1	11	11	11	10	8	10	11	11	11	11	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements:																			
M235.5D	Mean	0.2	0.9	0.01	—	—	—	—	18.6	9.23	93	313	8.1	25.2	72	64.5	20	83.3	—
	Median	0.2	0.67	0	—	—	—	—	19	9.5	92	314	8.1	20.5	52	57.8	17.8	75	—
	Minimum	0.2	0.32	0	—	—	—	—	5.5	2.4	32	204	7.3	10	13	15.4	5.4	15	—
	Maximum	0.2	2.3	0.09	—	—	—	—	31	20	196	400	9	55	175	159	47.7	288	—
	Std. dev.	0	0.56	0.02	—	—	—	—	8.96	5.15	45.7	47.4	0.45	13.8	48.3	40.2	10.7	66.4	—
	N obs.	17	17	16	0	0	0	0	17	17	17	17	13	16	15	17	17	16	0
M237.2G	Mean	0.2	2.09	0.18	90	4	0	0	16.5	10.5	104	408	8.4	30.6	57	67.1	12.7	31.2	—
	Median	0.2	2	0.11	90	4	0	0	15.6	10.1	97	434	8.3	27	36	46.7	11.2	19.5	—
	Minimum	0.2	0.84	0	90	4	0	0	1.9	6.8	83	131	7.9	10	15	18.6	4.7	3.74	—
	Maximum	0.2	4.4	0.68	90	4	0	0	29.5	16.2	173	494	9.5	65	360	298	41.8	101	—
	Std. dev.	0	0.93	0.2	—	—	—	—	10.1	2.97	21.2	90.8	0.39	12.8	75.5	63.1	8.4	28.8	—
	N obs.	19	19	19	1	1	1	1	19	19	19	19	16	19	19	19	19	18	0
M241.4K	Mean	0.2	9.55	—	—	—	—	—	15.9	10.9	106	413	8.3	29.9	46	71.9	13.6	42.7	—
	Median	0.2	9.6	—	—	—	—	—	15.7	10.4	99	431	8.2	30	34	50.2	12.6	26.5	—
	Minimum	0.2	6.3	—	—	—	—	—	1.5	6.6	80	206	8	15	16	18.1	5.5	3.74	—
	Maximum	0.2	12.2	—	—	—	—	—	29.3	17.2	160	492	9.2	60	150	344	51.6	140	—
	Std. dev.	0	1.77	—	—	—	—	—	9.72	2.99	20	76.6	0.32	11.8	31.7	72.2	10.1	42.3	—
	N obs.	19	19	0	0	0	0	0	19	19	19	19	16	19	19	19	19	18	0
MO02.0X	Mean	0.2	5.76	—	—	—	—	—	16.1	9.69	96	546	8.2	21.7	113	179	23.6	17.7	—
	Median	0.2	6.1	—	—	—	—	—	17.1	9.7	95	561	8.2	19	64	84.7	11.9	13.4	—
	Minimum	0.2	4	—	—	—	—	—	0.6	6.3	82	248	7.9	3	22	15.7	3.9	3.97	—
	Maximum	0.2	7.9	—	—	—	—	—	28.5	14.4	127	709	8.7	55	410	1231	128	44.1	—
	Std. dev.	0	1.09	—	—	—	—	—	9.58	2.1	11.1	147	0.23	13.5	125	267	27.9	11.7	—
	N obs.	20	19	0	0	0	0	0	20	20	20	20	18	20	19	20	20	20	0
PE01.8M	Mean	0.2	1.58	—	10	2	0	0	15.6	7.41	69	399	7.8	—	55	39.8	8.7	—	—
	Median	0.2	1.6	—	10	2	0	0	15.2	5.9	62	405	7.8	—	32	37.9	7.9	—	—
	Minimum	0.2	0.9	—	10	2	0	0	2	2.8	31	239	7.4	—	12	9.9	2.6	—	—
	Maximum	0.2	2.6	—	10	2	0	0	28.1	18.2	132	544	8.2	—	234	124	20.3	—	—
	Std. dev.	0	0.43	—	—	—	—	—	9.09	3.99	24.8	86.2	0.25	—	57	25.9	4.38	—	—
	N obs.	19	19	0	1	1	1	1	19	19	19	18	11	0	19	19	19	0	0
PI00.2M	Mean	0.2	3.14	—	100	15	100	5	16.2	9.25	92	528	8	42.5	76	123	15.3	—	—
	Median	0.2	3.2	—	100	15	100	5	15.7	9.25	85	517	7.9	42.5	24	25.3	7	—	—
	Minimum	0.2	2	—	100	15	100	5	0.3	4.1	49	149	7.6	3	7	6.6	2.1	—	—
	Maximum	0.2	4.4	—	100	15	100	5	31.2	16.3	145	825	8.4	88	1000	1989	187	—	—
	Std. dev.	0	0.55	—	—	—	—	—	9.79	2.88	27.6	135	0.26	20.9	218	439	40.4	—	—
	N obs.	20	20	0	1	1	1	1	20	20	20	20	17	20	20	20	20	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements:																			
WD00.2M	Mean	0.2	4.47	—	—	—	—	—	11.4	10.5	94	648	8	58.5	43	39.6	6.7	—	—
	Median	0.2	4.05	—	—	—	—	—	10.7	9.65	91	649	7.9	51	15	16.3	3.7	—	—
	Minimum	0.2	1	—	—	—	—	—	2.9	7.8	84	379	7.6	14	8	7	2.9	—	—
	Maximum	0.2	8.2	—	—	—	—	—	24.9	14.2	118	873	8.6	112	180	151	19.8	—	—
	Std. dev.	0	2.97	—	—	—	—	—	7.39	2.36	12.1	215	0.43	36.5	67.7	55.5	6.58	—	—
	N obs.	6	6	0	0	0	0	0	6	6	6	6	4	6	6	6	6	0	0
1994 Near-bottom measurements:																			
M201.7Q	Mean	3.98	4.18	—	—	—	—	—	11.5	10.8	93	—	—	—	—	98.3	19.4	15.3	—
	Median	4.35	4.55	—	—	—	—	—	10.2	10.3	95	—	—	—	—	98.3	19.4	15.3	—
	Minimum	1.7	1.9	—	—	—	—	—	0.9	1.3	17	—	—	—	—	98.3	19.4	15.3	—
	Maximum	5.3	5.5	—	—	—	—	—	27.3	16.9	137	—	—	—	—	98.3	19.4	15.3	—
	Std. dev.	1.02	1.02	—	—	—	—	—	8.57	4.22	27.8	—	—	—	—	—	—	—	—
	N obs.	14	14	0	—	—	—	—	14	14	14	0	0	—	0	1	1	1	0
M202.2N	Mean	1.92	2.12	0	—	—	—	—	14.2	9.75	90	142	—	—	—	185	30.6	18.7	—
	Median	1.9	2.1	0	—	—	—	—	13.3	9.5	91	142	—	—	—	185	30.6	18.7	—
	Minimum	1.1	1.3	0	—	—	—	—	2	3.2	42	142	—	—	—	185	30.6	18.7	—
	Maximum	2.4	2.6	0	—	—	—	—	28.2	17	130	142	—	—	—	185	30.6	18.7	—
	Std. dev.	0.37	0.37	—	—	—	—	—	9.04	3.61	23.3	—	—	—	—	—	—	—	—
	N obs.	13	13	1	—	—	—	—	13	13	13	1	0	—	0	1	1	1	0
M237.2G	Mean	1.73	1.94	—	—	—	—	—	13.2	12.1	115	—	—	—	—	—	—	—	—
	Median	1.5	1.7	—	—	—	—	—	14.2	12.6	98	—	—	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	1.9	9.7	93	—	—	—	—	—	—	—	—
	Maximum	2.5	2.7	—	—	—	—	—	26.5	16	170	—	—	—	—	—	—	—	—
	Std. dev.	0.68	0.67	—	—	—	—	—	9.46	2.35	28.8	—	—	—	—	—	—	—	—
	N obs.	7	7	0	—	—	—	—	7	7	7	0	0	—	0	0	0	0	0
1995 Near-surface measurements:																			
CA00.4M	Mean	0.2	3.51	1.3	85	4	25	1	15	10.2	99	577	7.8	29.9	143	175	18.4	9.36	27.4
	Median	0.2	2.7	1.3	85	4	25	1	14.7	9.9	94	600	7.7	28.5	35	34.8	9.5	9.36	27.4
	Minimum	0.2	1.1	1.3	70	1	0	0	0	5.2	58	232	7.3	3	19	13.8	3.1	9.36	27.4
	Maximum	0.2	9.5	1.3	100	7	50	1	30.8	14.5	167	761	8.3	57	1900	2316	158	9.36	27.4
	Std. dev.	0	2.37	—	21.2	4.24	35.4	.71	10.2	2.69	25	138	0.29	13.6	392	486	33.2	—	—
	N obs.	24	23	1	2	2	2	2	24	24	24	24	24	24	24	24	24	1	1

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements:																			
CU11.6M	Mean	0.2	7.15	0	60	6	0	0	16.7	10.2	104	351	7.7	19.5	138	179	17.1	—	—
	Median	0.2	7.15	0	60	6	0	0	15.9	7.9	85	369	7.7	19.5	22	23.3	6.4	—	—
	Minimum	0.2	5.8	0	60	6	0	0	0.9	5.4	68	155	7	7	11	9.6	2.5	—	—
	Maximum	0.2	8.5	0	60	6	0	0	31.5	25	347	547	8.5	32	1550	2337	165	—	—
	Std. dev.	0	1.91	—	—	—	—	—	9.92	4.89	61.7	122	0.47	17.7	356	534	37.2	—	—
	N obs.	19	2	1	1	1	1	1	19	19	19	19	16	2	19	19	19	0	0
DC01.0M	Mean	0.2	2.42	—	90	1	0	0	15.1	7.78	73	521	7.6	—	133	136	16.1	—	—
	Median	0.2	2.1	—	90	1	0	0	16.1	7.3	77	517	7.5	—	37	42.1	8.5	—	—
	Minimum	0.2	1.3	—	90	1	0	0	1.2	2.8	33	136	6.7	—	9	6.6	1.6	—	—
	Maximum	0.2	4.67	—	90	1	0	0	32.5	18.1	131	1098	10.3	—	1550	1745	153	—	—
	Std. dev.	0	0.98	—	—	—	—	—	9.65	3.89	27.5	231	0.71	—	326	352	29.9	—	—
	N obs.	24	22	0	1	1	1	1	24	24	24	24	22	0	24	24	24	0	0
I005.7M	Mean	0.2	1.07	0.04	—	—	—	—	14.3	10.9	102	635	8.1	22.1	72	73.7	13.1	50.2	—
	Median	0.2	0.46	0	—	—	—	—	14.7	12.4	105	627	8.1	24	43	57.3	11.8	29.3	—
	Minimum	0.2	0.34	0	—	—	—	—	4	5.4	69	490	7.6	10	24	21.1	-0.1	8.85	—
	Maximum	0.2	4.3	0.3	—	—	—	—	31	14.8	146	803	8.7	35	270	245	48.7	164	—
	Std. dev.	0	1.18	0.09	—	—	—	—	8.58	3.38	23.6	92.8	0.34	8.04	66.5	60	11.6	44.6	—
	N obs.	13	13	13	0	0	0	0	13	13	13	13	13	13	13	13	13	13	0
I007.0W	Mean	0.2	1.49	0.15	55	3	3	1	14.9	10	93	684	7.9	26	65	75.7	10.3	23.1	20.3
	Median	0.2	0.98	0.12	55	3	3	1	13.3	10.5	97	701	7.9	25.5	52	51	8.7	19.4	20.3
	Minimum	0.2	0.5	0	40	2	0	0	0	5	65	477	7.4	11	21	26.2	-0.1	8.55	20.3
	Maximum	0.2	5.5	0.55	70	4	5	2	33.1	16.4	116	862	8.8	62	260	370	38.8	61.1	20.3
	Std. dev.	0	1.38	0.16	21.2	1.41	3.54	1.4	10.6	3.43	14.1	93	0.29	10.8	49.8	70.7	7.01	13.8	—
	N obs.	24	24	19	2	2	2	2	24	24	24	24	23	24	24	24	24	24	1
M193.2F	Mean	0.2	7.7	1.15	5	3	0	0	13.5	10.2	92	582	7.9	21.1	130	212	22.6	27.3	23.7
	Median	0.2	7	1.15	5	3	0	0	12	10.5	97	556	8	21	66	103	13.1	14.3	23.7
	Minimum	0.2	4.8	1.15	5	3	0	0	1	5.5	67	404	7.4	4	22	28.7	4.9	6.04	23.7
	Maximum	0.2	13.7	1.15	5	3	0	0	29.4	15.2	112	809	8.2	43	580	981	93.4	228	23.7
	Std. dev.	0	2.29	—	—	—	—	—	10.2	3.2	11.3	119	0.25	11.8	135	227	20.8	45.9	—
	N obs.	25	25	1	1	1	1	1	25	25	25	25	25	25	25	25	25	25	1
M196.9Q	Mean	0.2	4.32	—	5	5	0	0	13.1	10.7	96	459	7.9	31.8	56	75.1	11.1	23.9	50.9
	Median	0.2	4	—	5	5	0	0	11.3	10.5	97	458	7.9	29	43	53.9	7.8	16.5	50.9
	Minimum	0.2	0.95	—	5	4	0	0	0.1	5.8	71	358	7.4	13	10	13.4	4.6	5.1	50.9
	Maximum	0.2	10.5	—	5	5	0	0	29.8	16.2	117	568	8.6	70	190	275	34.7	113	50.9
	Std. dev.	0	2.26	—	0	0.71	0	0	10.8	3.4	12.3	54.8	0.28	15.4	46.8	65	7.62	22.2	—
	N obs.	25	25	0	2	2	2	2	25	25	25	25	25	25	25	25	25	25	1

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements:																			
M201.7Q	Mean	0.2	4.76	0.01	90	4	0	0	15.6	10.5	100	438	8.2	38.7	31	31.2	7.3	32.2	—
	Median	0.2	4.6	0	90	4	0	0	15.9	10.4	100	431	8.2	35	31	27.8	6.6	23	—
	Minimum	0.2	3.4	0	90	4	0	0	0.5	4.7	58	370	7.6	19	10	8.1	3.7	11.4	—
	Maximum	0.2	7.6	0.2	90	4	0	0	29.2	17.2	123	511	8.8	83	67	60.6	12.8	98.8	—
	Std. dev.	0	1.02	0.04	—	—	—	—	9.71	3.56	17.4	39.5	0.32	16.5	14.1	14.1	2.48	25.8	—
	N obs.	22	22	21	1	1	1	1	22	22	22	22	21	22	22	22	22	22	0
M202.2N	Mean	0.2	2.27	0	—	—	—	—	16.7	10.4	103	432	8.2	36.3	31	34.5	9	43.4	—
	Median	0.2	2.1	0	—	—	—	—	16.8	10.7	98	417	8.1	31	32	37.3	8.6	26.2	—
	Minimum	0.2	1.2	0	—	—	—	—	1.9	5.8	70	383	7.7	19	10	8.6	3.4	3.86	—
	Maximum	0.2	6.1	0.09	—	—	—	—	30.3	15.6	199	492	8.8	82	54	54.7	25.8	220	—
	Std. dev.	0	1.21	0.02	—	—	—	—	9.26	3.33	27.4	34.5	0.3	17.1	14.7	14.9	4.69	49.1	—
	N obs.	21	21	19	0	0	0	0	21	21	21	21	20	21	21	21	21	21	0
M202.6T	Mean	0.2	11.5	0.4	—	—	—	—	17.9	9.23	92	434	7.9	41.7	42	54.4	7.8	15.9	—
	Median	0.2	11	0.4	—	—	—	—	20.6	7.8	95	406	7.9	41.5	27	35	6.2	14.5	—
	Minimum	0.2	8.9	0.4	—	—	—	—	0.5	5.9	72	354	7.5	15	11	11.5	-0.1	4.32	—
	Maximum	0.2	16.2	0.4	—	—	—	—	29.4	16	111	539	8.3	60	120	153	18.8	35.6	—
	Std. dev.	0	2.59	—	—	—	—	—	10.4	3.21	11.7	61.3	0.23	13.9	34.5	43.8	4.88	7.88	—
	N obs.	16	13	1	0	0	0	0	16	16	16	16	15	14	16	16	16	16	0
M203.5R	Mean	0.2	0.95	0.12	—	—	—	—	15.3	11	104	439	8.1	30.6	51	58.2	8.7	20.9	—
	Median	0.2	0.65	0.05	—	—	—	—	15.6	10.4	101	416	8.1	28.5	38	47.8	7.8	17.3	—
	Minimum	0.2	0.38	0	—	—	—	—	2.1	6.6	73	355	7.5	17	10	1.1	-0.1	3.74	—
	Maximum	0.2	3.7	0.6	—	—	—	—	30	18	131	531	8.5	57	251	170	20.1	54.5	—
	Std. dev.	0	0.92	0.2	—	—	—	—	10.1	3.72	17.4	56.3	0.27	11.3	55.8	45.5	4.74	12.8	—
	N obs.	17	17	15	0	0	0	0	17	17	17	17	16	16	17	17	17	17	0
M206.0S	Mean	0.2	1.1	0.01	97	6	51	2	15.7	13.5	133	413	8.4	33	42	48.4	13.5	71.1	44.5
	Median	0.2	1.02	0	96.5	6	65	2	14.7	12.5	129	408	8.4	23	43	46.7	12.6	71	44.5
	Minimum	0.2	0.35	0	95	3	0	0	1.1	6	72	362	7.5	16	8	10.7	5.7	3.63	44.5
	Maximum	0.2	3.3	0.14	100	9	75	3	32.6	25	355	469	9.1	75	81	125	26.2	164	44.5
	Std. dev.	0	0.68	0.04	2.45	2.75	34.7	1.3	10.5	5.22	55.5	27.1	0.42	19.1	21	27	5.94	46.7	—
	N obs.	24	24	23	4	4	4	4	24	24	24	24	22	23	24	24	24	24	1
M206.1T	Mean	0.2	1	0.01	100	6	8	1	13.8	9.81	92	452	7.9	27.6	42	45.7	10.8	30.2	11.3
	Median	0.2	0.7	0	100	6	8	1	14	9.6	89	441	7.9	22	45	46.2	9.5	18	11.3
	Minimum	0.2	0.5	0	100	5	0	0	3.8	5.3	59	356	7.1	17	10	11.5	4.7	7.48	11.3
	Maximum	0.2	2.7	0.06	100	6	15	1	28.3	15.1	125	610	8.2	48	64	81.6	21.8	122	11.3
	Std. dev.	0	0.8	0.02	0	0.71	10.6	.71	7.71	2.73	19.6	69.1	0.32	10.5	19.3	24.7	5.31	31.2	—
	N obs.	12	12	11	2	2	2	2	12	12	12	12	11	11	12	12	12	12	1

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements:																			
M235.5D	Mean	0.2	1.23	0.01	91.7	4	9	0	15.6	10	91	375	7.9	23.7	76	75.4	17.2	64.3	31.5
	Median	0.2	0.66	0	100	4	0	0	15.2	9.3	90	390	7.9	22	60	50.1	12.2	48.4	31.5
	Minimum	0.2	0.33	0	70	1	0	0	2.1	1.9	25	155	7.3	5	16	13.6	4.7	4.05	31.5
	Maximum	0.2	5.5	0.21	100	7	40	1	29.6	25	181	499	9.1	53	340	259	52.2	195	31.5
	Std. dev.	0	1.26	0.04	13.3	2.42	16.3	.52	9.85	6.28	42.9	76.9	0.49	12.7	73.2	71.8	12	53.6	—
	N obs.	24	24	22	6	6	6	6	24	24	24	24	23	21	24	24	24	24	1
M237.2G	Mean	0.2	2.22	0.37	67.5	2	0	0	16.3	10	97	424	7.9	28	71	91.9	12.8	29.5	—
	Median	0.2	1.8	0.35	67.5	2	0	0	16.7	9.85	100	433	7.9	24.5	52	90.2	12.7	20.1	—
	Minimum	0.2	0.81	0	60	1	0	0	2.2	5.2	68	212	7.3	8	11	-0.1	-0.1	3.74	—
	Maximum	0.2	6.1	1.09	75	2	0	0	30.1	17	128	507	8.4	64	270	187	26.4	144	—
	Std. dev.	0	1.41	0.33	10.6	0.71	0	0	9.71	3.11	15.5	71.6	0.3	14.1	63.4	57	6.53	31	—
	N obs.	20	20	17	2	2	2	2	20	20	20	20	20	20	20	20	20	20	0
M241.4K	Mean	0.2	11.2	—	—	—	—	—	12.8	11.6	103	464	8.1	39.5	46	72	10.8	32	57.1
	Median	0.2	11	—	—	—	—	—	10.8	10.6	101	463	8	30	45	64.1	10.2	21.4	57.1
	Minimum	0.2	8	—	—	—	—	—	0.1	6.3	57	364	7.7	17	6	-0.1	-0.1	3.05	57.1
	Maximum	0.2	17.7	—	—	—	—	—	29.5	20	137	586	8.6	80	96	195	22.5	148	57.1
	Std. dev.	0	2.35	—	—	—	—	—	10.9	4.07	16.3	54.8	0.28	23.4	29.7	58	6.47	30.2	—
	N obs.	23	23	0	0	0	0	0	23	23	23	23	22	23	23	23	23	23	1
MO02.0X	Mean	0.2	6.9	—	—	—	—	—	13.9	9.72	89	626	7.8	20	156	264	26.5	10.9	2.6
	Median	0.2	6.1	—	—	—	—	—	12.6	9.4	94	631	7.9	16	78	113	15.8	8.91	2.6
	Minimum	0.2	4.5	—	—	—	—	—	1.4	5.5	67	402	7.3	4	22	31.7	5.1	2.49	2.6
	Maximum	0.2	11	—	—	—	—	—	29.5	13.7	100	824	8.1	46	590	1107	97.9	24.8	2.6
	Std. dev.	0	1.88	—	—	—	—	—	9.83	2.82	9.73	140	0.23	12.8	155	284	25.8	6.25	—
	N obs.	25	25	0	0	0	0	0	25	25	25	25	25	25	25	25	25	25	1
PE01.8M	Mean	0.2	2.22	—	54.5	4	3	1	14.5	7.94	74	429	7.6	41	103	116	12.8	25.4	—
	Median	0.2	1.9	—	56.5	4	0	0	14.7	7.5	75	402	7.6	41	43	41.3	7.8	21.8	—
	Minimum	0.2	1.2	—	5	1	0	0	0.1	3.2	38	169	7	28	6	3.4	1.1	12.8	—
	Maximum	0.2	5.3	—	100	6	10	3	30.2	17.4	119	652	10.2	54	1400	1751	129	44.2	—
	Std. dev.	0	0.98	—	51.6	2.38	5	1.5	9.74	3.31	20.5	134	0.64	18.4	284	350	25	13.6	—
	N obs.	24	24	0	4	4	4	4	24	24	24	24	22	2	23	24	24	5	0
PI00.2M	Mean	0.2	3.39	—	97.5	6	30	1	16	9.31	89	565	7.8	42.5	55	77	9.9	64.4	—
	Median	0.2	3.4	—	97.5	6	30	1	15.9	8.7	89	564	7.8	36	27	27.7	5.9	64.4	—
	Minimum	0.2	1.4	—	95	4	0	0	0.2	2.6	34	251	7.3	3	10	7.3	1.9	64.4	—
	Maximum	0.2	5.2	—	100	8	60	1	30	16.6	129	748	8.4	115	600	1141	90.5	64.4	—
	Std. dev.	0	0.89	—	3.54	2.83	42.4	.71	9.73	3.76	24.4	120	0.25	26.1	124	238	18.1	—	—
	N obs.	22	20	0	2	2	2	2	22	22	22	22	22	20	22	22	22	1	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements:																			
WD00.2M	Mean	0.2	3.15	—	—	—	—	—	17.8	7.63	78	745	7.6	50.1	43	46.7	7.5	15.9	—
	Median	0.2	2.4	—	—	—	—	—	17.2	7	74	785	7.6	37.5	29	26.4	5.2	15.9	—
	Minimum	0.2	1.05	—	—	—	—	—	1.5	4.5	50	399	7.1	6	6	7.5	2.9	12.7	—
	Maximum	0.2	7.5	—	—	—	—	—	31	13.8	114	968	8	130	260	336	37.3	19.1	—
	Std. dev.	0	1.75	—	—	—	—	—	8.67	2.47	16	199	0.25	35.4	58.8	76.4	7.93	4.51	—
	N obs.	18	18	0	0	0	0	0	18	18	18	18	18	18	18	18	18	2	0
1995 Near-bottom measurements:																			
I007.0W	Mean	2.21	2.43	—	—	—	—	—	13.3	9.64	90	706	8	—	—	—	—	—	—
	Median	1.4	1.63	—	—	—	—	—	13.2	10.3	96	735	8.1	—	—	—	—	—	—
	Minimum	0.9	1.16	—	—	—	—	—	1.9	5.9	64	477	7.7	—	—	—	—	—	—
	Maximum	5.3	5.5	—	—	—	—	—	22.1	13.2	104	815	8.2	—	—	—	—	—	—
	Std. dev.	1.61	1.6	—	—	—	—	—	6.09	2.5	15.2	110	0.18	—	—	—	—	—	—
	N obs.	8	8	0	—	—	—	—	8	8	8	7	6	—	0	0	0	0	0
M201.7Q	Mean	4.56	4.76	—	—	—	—	—	15.1	9.5	88	444	8	—	—	—	—	—	—
	Median	4.4	4.6	—	—	—	—	—	14.4	8.8	84	429	7.9	—	—	—	—	—	—
	Minimum	3.2	3.4	—	—	—	—	—	0.6	3.8	49	380	7.4	—	—	—	—	—	—
	Maximum	7.4	7.6	—	—	—	—	—	28.5	17.1	120	510	8.8	—	—	—	—	—	—
	Std. dev.	1.02	1.02	—	—	—	—	—	9.49	4.01	21	40.6	0.35	—	—	—	—	—	—
	N obs.	22	22	0	—	—	—	—	22	22	22	21	21	—	0	0	0	0	0
M202.2N	Mean	2.07	2.27	—	—	—	—	—	16.6	10	99	432	8.1	—	—	—	—	—	—
	Median	1.9	2.1	—	—	—	—	—	16.2	10.4	95	420	8	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	1.9	5.5	63	383	7.7	—	—	—	—	—	—
	Maximum	5.9	6.1	—	—	—	—	—	30.2	15.4	181	494	8.8	—	—	—	—	—	—
	Std. dev.	1.21	1.21	—	—	—	—	—	9.23	3.32	25.5	33.3	0.3	—	—	—	—	—	—
	N obs.	21	21	0	—	—	—	—	21	21	21	21	20	—	0	0	0	0	0
M206.0S	Mean	1.25	1.48	—	—	—	—	—	17.7	10.7	104	413	8.2	—	44	—	—	—	—
	Median	0.9	1.15	—	—	—	—	—	21.5	9	100	413	8.1	—	44	—	—	—	—
	Minimum	0.8	1.03	—	—	—	—	—	1.6	5.4	63	362	7.6	—	44	—	—	—	—
	Maximum	3.1	3.3	—	—	—	—	—	30.4	22.4	160	469	9.1	—	44	—	—	—	—
	Std. dev.	0.84	0.83	—	—	—	—	—	9.63	5.41	31.5	27.9	0.4	—	—	—	—	—	—
	N obs.	11	11	0	—	—	—	—	11	11	11	11	11	—	1	0	0	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-bottom measurements:																			
M235.5D	Mean	2.36	2.57	—	—	—	—	—	21.5	4.05	43	399	7.4	—	50	19.1	4.4	9.95	—
	Median	2.15	2.35	—	—	—	—	—	22.7	3.35	42	438	7.4	—	50	19.1	4.4	9.95	—
	Minimum	0.9	1.16	—	—	—	—	—	9.8	1	13	160	7.1	—	50	19.1	4.4	9.95	—
	Maximum	5.3	5.5	—	—	—	—	—	29.5	8.1	74	500	7.6	—	50	19.1	4.4	9.95	—
	Std. dev.	1.44	1.43	—	—	—	—	—	7.76	2.45	20.5	106	0.16	—	—	—	—	—	—
	N obs.	8	8	0	—	—	—	—	8	8	8	8	7	—	1	1	1	1	0
M237.2G	Mean	1.75	1.95	—	—	—	—	—	19.6	9.09	95	434	7.9	—	—	—	—	—	—
	Median	1.6	1.8	—	—	—	—	—	25.6	7.8	98	464	7.9	—	—	—	—	—	—
	Minimum	1.2	1.4	—	—	—	—	—	3.4	5.2	68	315	7.3	—	—	—	—	—	—
	Maximum	2.8	3	—	—	—	—	—	30	13.3	118	507	8.4	—	—	—	—	—	—
	Std. dev.	0.54	0.54	—	—	—	—	—	10	2.87	13.6	61.4	0.3	—	—	—	—	—	—
	N obs.	11	11	0	—	—	—	—	11	11	11	11	11	—	0	0	0	0	0
1996 Near-surface measurements:																			
CA00.4M	Mean	0.2	2.56	0.85	72.5	2	0	0	13.7	11.2	106	560	7.7	30	122	118	17.4	—	—
	Median	0.2	2.2	0.85	72.5	2	0	0	13	10.1	92	587	7.7	25	33	40.7	9.3	—	—
	Minimum	0.2	0.3	0.85	50	2	0	0	0.2	6	65	172	7.1	4	10	7.6	3.3	—	—
	Maximum	0.2	6.7	0.85	95	2	0	0	30.3	25	329	880	8.5	80	940	711	78.1	—	—
	Std. dev.	0	1.75	—	31.8	0	0	0	10.4	4.6	52.8	179	0.38	20.5	228	203	20.5	—	—
	N obs.	22	22	1	2	2	2	2	22	22	22	22	22	21	22	22	22	0	0
CU11.6M	Mean	0.2	5.43	0	—	—	—	—	16	10.2	101	332	7.7	35.3	152	170	19.2	—	—
	Median	0.2	6.1	0	—	—	—	—	15.5	11.2	97	339	7.6	35	51	51.8	11	—	—
	Minimum	0.2	3.8	0	—	—	—	—	2.6	5.8	73	142	7.2	24	9	11	2.8	—	—
	Maximum	0.2	6.4	0	—	—	—	—	30.6	17	186	468	8.4	47	790	778	77.3	—	—
	Std. dev.	0	1.42	—	—	—	—	—	9.3	3.1	29.5	93.8	0.42	11.5	220	263	22.5	—	—
	N obs.	15	3	1	0	0	0	0	15	15	15	15	14	3	15	15	15	0	0
DC01.0M	Mean	0.2	2.02	—	66.7	8	10	0	14.5	7.17	64	690	7.3	77	71	79.3	11.2	—	—
	Median	0.2	1.95	—	95	5	0	0	16.5	7.2	69	602	7.3	77	46	47.3	8.2	—	—
	Minimum	0.2	0.7	—	5	2	0	0	0.4	1.6	20	232	7	75	5	10.1	2.2	—	—
	Maximum	0.2	5.3	—	100	16	30	1	28.6	13.5	101	2262	7.7	79	320	394	38.1	—	—
	Std. dev.	0	0.93	—	53.5	7.37	17.3	.58	9.71	4.01	25.7	454	0.2	2.83	74.7	96.6	8.65	—	—
	N obs.	23	21	0	3	3	3	3	23	23	23	23	21	2	23	23	23	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements:																			
I005.7M	Mean	0.19	1.05	0.03	96	6	20	1	15.3	11.6	118	640	8.1	17.7	84	108	18.9	67.7	—
	Median	0.2	0.49	0	96	6	20	1	13.5	10.9	97	560	8.1	17	74	76.7	17.2	31.6	—
	Minimum	0	0.36	0	95	3	0	0	0.5	6.9	78	377	7.6	9	18	26.3	4.5	11.8	—
	Maximum	0.2	3.4	0.19	97	8	40	1	33.2	25	359	918	8.9	34	200	267	40.1	293	—
	Std. dev.	0.05	1.04	0.06	1.41	3.54	28.3	.71	10.5	4.5	69	179	0.4	6.82	53.3	76.1	12.2	77.1	—
	N obs.	15	15	15	2	2	2	2	15	15	15	15	13	15	15	15	15	14	0
I007.0W	Mean	0.2	1.56	0.15	80	5	0	0	15.5	9.25	89	687	7.9	22.9	77	79.3	11.6	18.8	—
	Median	0.2	1.2	0.1	80	5	0	0	16	9.3	88	718	7.9	22	49	59.3	9.4	15.2	—
	Minimum	0.2	0.52	0	80	5	0	0	0	4.5	54	373	7.3	8	23	27.2	4.8	4.23	—
	Maximum	0.2	5.4	0.5	80	5	0	0	29.1	14.6	121	951	8.5	45	370	181	24.1	47	—
	Std. dev.	0	1.25	0.15	—	—	—	—	9.46	2.95	17.1	158	0.29	8.6	76.3	48.8	5.63	12.8	—
	N obs.	23	23	20	1	1	1	1	23	23	23	23	21	23	23	23	23	22	0
M193.2F	Mean	0.2	7.72	—	7.5	8	0	0	14	9.86	91	554	7.8	19.6	207	318	30.9	21.8	—
	Median	0.2	7	—	7.5	8	0	0	13.5	9.2	92	568	7.8	15	80	131	15.5	16.5	—
	Minimum	0.2	4.3	—	5	5	0	0	0.1	5.4	59	360	7.3	4	15	17.9	3.3	-1	—
	Maximum	0.2	18.3	—	10	10	0	0	28	15.2	117	740	8.2	65	1100	1795	156	104	—
	Std. dev.	0	2.78	—	3.54	3.54	0	0	9.75	2.8	12.2	106	0.22	14	284	417	34.8	21.5	—
	N obs.	25	25	0	2	2	2	2	25	25	25	25	25	25	25	25	25	25	0
M196.9Q	Mean	0.2	3.89	0	16.7	7	0	0	13	10.7	97	445	7.9	34.1	66	93.5	12.2	17.2	—
	Median	0.2	3.35	0	10	7	0	0	13.2	9.9	98	444	7.9	34	26	39	7.9	13.2	—
	Minimum	0.2	1.14	0	5	5	0	0	0.2	6.8	70	264	7.3	8	5	7.4	2	-1	—
	Maximum	0.2	7.5	0	35	10	0	0	28.3	17.2	129	576	8.3	90	350	501	47.3	56.7	—
	Std. dev.	0	1.89	—	16.1	2.52	0	0	10.3	2.95	12.9	74.5	0.24	19.4	87.8	120	11.6	14.5	—
	N obs.	26	26	1	3	3	3	3	26	26	26	26	26	25	26	26	26	26	0
M201.7Q	Mean	0.2	4.49	0.01	80	8	2	0	14.1	10.8	102	428	8	39.8	36	35.5	7.1	20.2	—
	Median	0.2	4.6	0	90	3	0	0	13.1	11.2	99	433	8.1	38	22	27.6	5.7	14.8	—
	Minimum	0.2	3	0	50	1	0	0	0.3	6.8	70	264	7.4	9	4	4.4	2.2	3.29	—
	Maximum	0.2	6.4	0.14	100	20	5	1	28.6	14.8	150	564	8.5	110	220	188	26.2	82.9	—
	Std. dev.	0	0.83	0.03	26.5	10.4	2.89	.58	10.3	2.5	18.6	63.4	0.25	22.6	44.1	36.8	4.85	17.9	—
	N obs.	25	25	22	3	3	3	3	25	25	25	25	25	24	25	25	25	25	0
M202.2N	Mean	0.2	2.3	0	95	12	0	0	14.8	10.6	101	427	8.1	41.5	37	35.8	7.6	26.1	—
	Median	0.2	2.3	0	95	12	0	0	15	10.5	97	437	8.1	35	25	27.9	6.7	18.3	—
	Minimum	0.2	0.8	0	90	1	0	0	1.1	6.4	70	263	7.3	9	5	5.2	2.6	2.27	—
	Maximum	0.2	5.2	0	100	23	0	0	28.7	15.5	144	565	8.6	108	190	134	17.2	100	—
	Std. dev.	0	0.85	0	7.07	15.6	0	0	9.81	2.76	16.9	62.1	0.27	26.5	40.1	29.4	3.93	23.2	—
	N obs.	24	24	23	2	2	2	2	24	24	24	24	24	24	24	24	24	24	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements:																			
M202.6T	Mean	0.2	12.2	—	5	3	0	0	14	10.4	97	421	7.9	35.4	70	94.2	12.2	18.7	—
	Median	0.2	11	—	5	3	0	0	14.5	10	98	428	8	35	31	36.5	7	13.5	—
	Minimum	0.2	5.1	—	5	3	0	0	0.1	6.7	68	263	7.3	7	8	8.9	2.5	4.22	—
	Maximum	0.2	19	—	5	3	0	0	27.6	15.1	127	519	8.4	86	370	534	50.4	58.1	—
	Std. dev.	0	3.92	—	0	0	0	0	9.97	2.68	13.1	65.6	0.27	18.8	92	121	11.5	14.3	—
	N obs.	24	23	0	2	2	2	2	24	24	24	24	24	23	24	24	24	24	0
M203.5R	Mean	0.2	0.91	0.09	100	14	30	1	12.1	11.7	105	423	8	29.1	67	84.5	11.6	19.8	—
	Median	0.2	0.7	0	100	14	30	1	9.7	12.2	105	421	8.1	29	32	45	8	13.9	—
	Minimum	0.2	0.5	0	100	11	0	0	0.3	6.9	72	261	7.3	9	5	3.8	1.7	-1	—
	Maximum	0.2	3	0.6	100	16	60	1	29.1	16.5	132	543	8.5	55	350	505	46.3	64.2	—
	Std. dev.	0	0.68	0.19	0	3.54	42.4	.71	10.3	2.66	17.3	68.8	0.32	13.4	96	121	11.7	15.9	—
	N obs.	20	20	19	2	2	2	2	20	20	20	20	19	17	20	20	20	20	0
M206.0S	Mean	0.2	1.16	0.01	93.3	7	17	1	14.9	13.7	131	389	8.5	32	60	61.5	14.4	72.3	—
	Median	0.2	1.08	0	100	6	0	0	16.9	13.9	140	404	8.6	26	32	43.5	13.4	69.7	—
	Minimum	0.2	0.55	0	80	1	0	0	1	5.2	55	264	7.1	9	7	5.8	3.8	3.14	—
	Maximum	0.2	2.7	0.23	100	15	50	2	29.6	25	185	517	9.1	85	210	196	37.1	210	—
	Std. dev.	0	0.49	0.05	11.5	7.09	28.9	1.2	9.98	4.67	36.4	61.9	0.56	20.6	62.9	56	7.52	56.2	—
	N obs.	23	23	23	3	3	3	3	23	23	23	23	22	23	23	23	23	22	0
M206.1T	Mean	0.2	1.01	0.01	90	10	30	1	16.2	8.49	83	470	7.7	32.9	50	49.5	13	41.7	—
	Median	0.2	0.73	0	100	10	0	0	18.7	7.1	79	494	7.6	25	39	45.4	11.9	32.4	—
	Minimum	0.2	0.55	0	70	4	0	0	3	3	32	262	7.2	9	9	10.7	4	1.22	—
	Maximum	0.2	2.5	0.09	100	16	90	3	31.4	17.2	183	599	8.3	60	210	158	33.6	189	—
	Std. dev.	0	0.68	0.02	17.3	6	52	1.7	8.58	4.62	43	98	0.33	17.6	54.3	37.1	7.33	45.3	—
	N obs.	17	17	17	3	3	3	3	17	17	17	17	17	17	17	17	17	17	0
M235.5D	Mean	0.2	1.6	0.04	100	1	0	0	18.6	7.71	79	379	7.6	21.7	129	137	22.2	48.7	—
	Median	0.2	1.18	0	100	1	0	0	18.8	7.85	78	402	7.6	17.5	79	91.8	18.5	30	—
	Minimum	0.2	0.37	0	100	1	0	0	3.4	2.8	36	167	7.1	5	12	16.8	5.8	6.5	—
	Maximum	0.2	4.5	0.26	100	1	0	0	28.2	13	138	486	8.2	60	420	366	52	280	—
	Std. dev.	0	1.36	0.09	—	—	—	—	7.99	3.12	27.5	97.1	0.29	15.9	128	120	15.8	70.7	—
	N obs.	14	14	14	1	1	1	1	14	14	14	14	14	14	14	14	14	14	0
M237.2G	Mean	0.2	2.66	0.44	37.5	4	0	0	13.3	10.5	97	397	7.8	27.2	119	155	18.1	17.7	—
	Median	0.2	2.25	0.43	37.5	4	0	0	11.6	9.9	95	423	7.9	27	51	72.9	10.6	12.3	—
	Minimum	0.2	0.9	0	5	4	0	0	0.4	6.4	76	150	7	6	11	13.4	3.6	1.8	—
	Maximum	0.2	6	1.18	70	4	0	0	28.2	15.2	129	478	8.3	64	650	841	76.2	53.1	—
	Std. dev.	0	1.62	0.42	46	0	0	0	10.1	2.8	14.9	90.2	0.34	15.5	172	212	19.3	15.6	—
	N obs.	18	18	17	2	2	2	2	18	18	18	18	18	18	18	18	18	18	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements:																			
M241.4K	Mean	0.2	10.3	—	—	—	—	—	14.7	10.6	101	411	8	29.4	69	96.5	13.1	25.6	—
	Median	0.2	9.85	—	—	—	—	—	15.4	10.2	103	420	8	29	36	53.6	9.1	17.5	—
	Minimum	0.2	6.2	—	—	—	—	—	0.3	6.8	78	272	7.5	6	12	15.3	3.8	5.76	—
	Maximum	0.2	14.6	—	—	—	—	—	27.6	15.1	122	485	8.4	63	320	392	43.1	61.5	—
	Std. dev.	0	2.17	—	—	—	—	—	9.79	2.62	13.1	56	0.28	14	82.4	99.2	10.4	18	—
	N obs.	22	22	0	0	0	0	0	22	22	22	22	22	22	22	22	22	22	0
MO02.0X	Mean	0.2	6.8	—	5	5	0	0	14.3	9.51	89	615	7.8	17	264	476	41.7	17	—
	Median	0.2	6	—	5	5	0	0	13.4	9.1	91	620	7.8	13	120	192	21.8	10.9	—
	Minimum	0.2	3.4	—	5	5	0	0	0.2	5	54	370	7.4	2	19	25.4	3.3	3.61	—
	Maximum	0.2	12	—	5	5	0	0	28.2	15.1	116	770	8.2	60	1600	2909	239	78.7	—
	Std. dev.	0	2.45	—	—	—	—	—	9.67	2.79	12.2	105	0.2	13.5	367	687	52.8	16.6	—
	N obs.	25	25	0	1	1	1	1	25	25	25	25	25	25	25	25	25	24	0
PE01.8M	Mean	0.2	1.42	—	65	10	30	0	13.2	9.15	82	447	7.5	—	47	55.5	9.3	7.84	—
	Median	0.2	1.38	—	90	10	0	0	13.7	9.3	81	474	7.4	—	31	37.2	8	7.84	—
	Minimum	0.2	0.8	—	5	2	0	0	0.2	3.9	48	273	7.2	—	3	4.5	1.8	7.84	—
	Maximum	0.2	2.2	—	100	17	90	1	30.1	14.4	135	597	8.3	—	130	244	22.2	7.84	—
	Std. dev.	0	0.43	—	52.2	7.51	52	.58	10.2	3.51	23.3	99.3	0.29	—	40.4	57.1	6	—	—
	N obs.	21	20	0	3	3	3	3	21	21	21	21	19	0	21	21	21	1	0
PI00.2M	Mean	0.2	3.06	—	79	8	17	1	13.7	8.58	82	530	7.7	44.3	91	112	12.7	—	—
	Median	0.2	3.03	—	90	4	0	0	14.8	7.8	78	535	7.7	35.5	24	26.8	6.4	—	—
	Minimum	0.2	2.1	—	30	1	0	0	0.1	4.9	49	143	7.2	5	5	4.2	1.6	—	—
	Maximum	0.2	3.9	—	100	21	80	4	28.7	13.5	161	701	8.2	143	950	1609	110	—	—
	Std. dev.	0	0.55	—	29.2	7.97	35.3	1.7	9.99	2.37	23.9	144	0.27	39.6	196	321	22.3	—	—
	N obs.	25	14	0	5	5	5	5	25	25	25	25	24	14	25	25	25	0	0
WD00.2M	Mean	0.2	3.22	0.7	20	1	0	0	14.4	9.34	88	660	7.6	37.9	119	169	16.5	—	—
	Median	0.2	2.6	0.7	20	1	0	0	11.2	9.05	91	682	7.6	34	32	34.1	7.4	—	—
	Minimum	0.2	0.64	0.7	20	1	0	0	0.7	5.2	65	202	7.4	5	6	8.9	2.8	—	—
	Maximum	0.2	9.2	0.7	20	1	0	0	27	13.2	108	1131	8	93	920	1692	120	—	—
	Std. dev.	0	2.5	—	—	—	—	—	9.05	2.66	11.7	264	0.15	28.9	241	442	30.3	—	—
	N obs.	14	14	1	1	1	1	1	14	14	14	14	14	13	14	14	14	0	0

Table E-1. Continued.

Sampling location	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-bottom measurements:																			
M201.7Q	Mean	4.29	4.49	—	—	—	—	—	13.4	9.47	85	433	7.8	—	57	56.8	10.7	15.6	—
	Median	4.4	4.6	—	—	—	—	—	12.9	9.8	93	433	7.8	—	56	52.3	9.5	7.7	—
	Minimum	2.8	3	—	—	—	—	—	0.4	3.3	40	263	7.3	—	35	41.5	8.2	3.42	—
	Maximum	6.2	6.4	—	—	—	—	—	27.7	14	111	566	8.2	—	79	81.2	15.5	43.7	—
	Std. dev.	0.83	0.83	—	—	—	—	—	9.61	3.45	17	63.8	0.23	—	22.7	17.5	3.36	19.1	—
	N obs.	25	25	0	—	—	—	—	25	25	25	23	23	—	4	4	4	4	0
M202.2N	Mean	2.17	2.37	—	—	—	—	—	13.9	10	93	429	8	—	—	—	—	—	—
	Median	2.2	2.4	—	—	—	—	—	12.2	9.9	92	437	8.1	—	—	—	—	—	—
	Minimum	1	1.27	—	—	—	—	—	1.2	5.1	64	262	7.3	—	—	—	—	—	—
	Maximum	5	5.2	—	—	—	—	—	27.6	15.3	145	566	8.3	—	—	—	—	—	—
	Std. dev.	0.81	0.8	—	—	—	—	—	9.31	3.19	19.9	60.5	0.27	—	—	—	—	—	—
	N obs.	23	23	0	—	—	—	—	23	23	23	21	21	—	0	0	0	0	0
M206.0S	Mean	1.14	1.36	—	—	—	—	—	12.3	12.3	108	400	8.3	—	44	54.2	14.4	96.3	—
	Median	0.9	1.12	—	—	—	—	—	16.6	12.1	109	413	8.6	—	44	54.2	14.4	96.3	—
	Minimum	0.8	1	—	—	—	—	—	1.3	5.1	52	262	7.1	—	44	54.2	14.4	96.3	—
	Maximum	2.5	2.7	—	—	—	—	—	26.3	25	178	523	8.9	—	44	54.2	14.4	96.3	—
	Std. dev.	0.54	0.53	—	—	—	—	—	8.87	5.59	33.8	70.5	0.6	—	—	—	—	—	—
	N obs.	14	14	0	—	—	—	—	14	14	14	13	13	—	1	1	1	1	0
M235.5D	Mean	2.44	2.64	—	—	—	—	—	19.3	4.59	47	349	7.2	—	195	187	25.8	10.1	—
	Median	1.8	2	—	—	—	—	—	19.5	3.3	39	387	7.3	—	59	52.8	9.2	11.9	—
	Minimum	1.3	1.5	—	—	—	—	—	10.3	0.3	4	151	6.9	—	35	37.1	9	5.77	—
	Maximum	4.3	4.5	—	—	—	—	—	26.1	8.6	80	483	7.5	—	490	471	59.3	12.7	—
	Std. dev.	1.21	1.21	—	—	—	—	—	5.89	3.28	29.8	133	0.21	—	256	246	29	3.77	—
	N obs.	7	7	0	—	—	—	—	7	7	7	7	7	—	3	3	3	3	0
M237.2G	Mean	1.87	2.08	—	—	—	—	—	13.6	10.9	99	437	7.9	—	—	—	—	—	—
	Median	1.9	2.1	—	—	—	—	—	8.3	12.3	98	438	8	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	0.5	6.4	79	384	7.5	—	—	—	—	—	—
	Maximum	3.2	3.4	—	—	—	—	—	27.5	15.2	121	474	8.3	—	—	—	—	—	—
	Std. dev.	0.7	0.7	—	—	—	—	—	11.4	3.18	12.8	29.2	0.22	—	—	—	—	—	—
	N obs.	12	12	0	—	—	—	—	12	12	12	12	12	—	0	0	0	0	0

Table E-2. Annual summaries (1993–1996) of chemical measurements at fixed sites grouped into near-surface (less than or equal to 0.2 m below the surface) and near-bottom (less than or equal to 0.2 m above the substrate) categories. Below-surface chemical samples are infrequently collected.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1993 Near-surface measurements:													
BC04.6M	Mean	2.01	0.09	0.94	0.077	0.038	5.37	64.2	2.77	—	—	14.8	—
	Median	1.87	0.05	0.83	0.068	0.029	5.7	51.2	2.43	—	—	12.2	—
	Minimum	1.24	-0.02	0.71	0.028	0.01	2.16	49.7	1.9	—	—	9.99	—
	Maximum	3.01	0.3	1.54	0.14	0.092	7.15	85.3	4.3	—	—	30.2	—
	Std. dev.	0.531	0.097	0.283	0.038	0.024	1.345	16.95	0.808	—	—	7.084	—
	N obs.	8	10	10	8	10	10	4	9	0	0	7	0
CA00.4M	Mean	2.92	0.1	1.8	0.21	0.1	5.28	64.8	3.99	—	—	26.2	—
	Median	2.82	0.09	1.45	0.18	0.086	5.38	58.4	3.7	—	—	20.8	—
	Minimum	1.21	0.04	0.75	0.1	0.03	2.64	53.2	2.9	—	—	17.9	—
	Maximum	4.62	0.3	3.61	0.32	0.25	7.21	75	5.4	—	—	46	—
	Std. dev.	0.965	0.07	0.924	0.078	0.066	1.367	10.63	0.855	—	—	9.76	—
	N obs.	10	12	12	10	12	12	4	9	0	0	8	0
CU11.6M	Mean	3.24	0.1	1.19	0.17	0.088	4.82	50.3	4.28	—	—	17.8	—
	Median	2.97	0.1	0.99	0.15	0.083	4.55	42.4	4.4	—	—	13.8	—
	Minimum	1.7	0.09	0.48	0.061	-0.01	3.45	30.2	3.1	—	—	10.9	—
	Maximum	6.35	0.2	3.37	0.37	0.23	6.89	65	5.3	—	—	36.4	—
	Std. dev.	1.287	0.044	0.761	0.095	0.066	1.118	16.96	0.661	—	—	8.692	—
	N obs.	9	12	12	9	12	12	4	9	0	0	8	0
DC01.0M	Mean	3.3	0.2	1.14	0.24	0.075	3.93	47	3.98	—	—	49.3	—
	Median	3.01	0.1	1.07	0.26	0.066	4.61	36.7	3.7	—	—	18.7	—
	Minimum	2.02	0.08	0.27	0.067	0.024	0.91	33.6	3.3	—	—	10.7	—
	Maximum	4.27	0.3	2.52	0.34	0.18	5.63	63.3	5.18	—	—	169	—
	Std. dev.	1.004	0.087	0.724	0.091	0.051	1.945	14.21	0.747	—	—	67.01	—
	N obs.	6	7	7	6	7	7	4	5	0	0	5	0
I005.7M	Mean	5.07	0.07	3.2	0.22	0.11	3.17	47.6	3.26	—	—	62.7	—
	Median	4.99	0.06	2.99	0.2	0.12	3.73	50	3	—	—	26.2	—
	Minimum	3.1	-0.02	0.93	0.13	-0.01	0.14	34.1	2.9	—	—	25.1	—
	Maximum	8.19	0.1	5.35	0.45	0.16	5.31	58.8	4	—	—	164	—
	Std. dev.	1.563	0.055	1.274	0.096	0.053	1.887	12.52	0.393	—	—	67.58	—
	N obs.	9	10	10	9	10	10	3	8	0	0	4	0
I007.0W	Mean	6.01	0.1	4.15	0.24	0.37	3.73	63.8	3.49	—	—	29.3	—
	Median	5.97	0.1	3.87	0.23	0.14	4.14	57.4	3.4	—	—	28.9	—
	Minimum	3.72	-0.02	-0.01	0.14	0.07	0.79	45.7	2.7	—	—	19.6	—
	Maximum	9.33	0.2	6.73	0.45	3.82	5.03	101	5.08	—	—	35.9	—
	Std. dev.	1.539	0.068	1.808	0.08	0.922	1.138	17.13	0.66	—	—	5.198	—
	N obs.	13	15	16	13	16	15	8	13	0	0	7	0

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1993 Near-surface measurements:							
M193.2F	Mean	3.18	0.05	1.97	0.29	0.094	5.41	50.1	5	—	—	42.4	—
	Median	3.04	0.04	1.78	0.26	0.08	5.69	50.8	5	—	—	19.6	—
	Minimum	1.82	0.03	0.76	0.15	0.038	4.1	31	3.97	—	—	8.66	—
	Maximum	5.17	0.1	2.95	0.6	0.19	6.59	59.8	6.24	—	—	204	—
	Std. dev.	1.062	0.032	0.709	0.14	0.044	0.742	13.39	0.78	—	—	65.68	—
	N obs.	9	12	12	9	12	12	4	9	0	0	8	0
M196.9Q	Mean	4.22	0.05	2.99	0.19	0.085	4.16	47.4	3.13	—	—	24.5	—
	Median	4.39	0.04	2.73	0.17	0.095	4.23	44	3.1	—	—	14.9	—
	Minimum	2.18	-0.02	1.78	0.087	-0.01	1.25	43.1	2.5	—	—	10.8	—
	Maximum	5.47	0.1	4.46	0.31	0.17	5.61	52.8	3.7	—	—	86.6	—
	Std. dev.	0.943	0.035	0.841	0.082	0.049	1.199	4.634	0.435	—	—	25.37	—
	N obs.	10	12	12	10	12	12	4	9	0	0	8	0
M201.7Q	Mean	3.67	0.06	2.31	0.16	0.056	3.67	50.1	3.47	—	—	20.3	—
	Median	3.76	0.05	2.08	0.16	0.032	3.2	48.4	3.41	—	—	16	—
	Minimum	1.77	-0.02	1	0.063	0.016	2.24	37.1	2.9	—	—	13.3	—
	Maximum	5.34	0.1	3.51	0.3	0.13	6.33	63.8	4.04	—	—	40.9	—
	Std. dev.	1.019	0.036	0.741	0.068	0.04	1.356	10.94	0.424	—	—	9.716	—
	N obs.	9	10	10	9	10	10	4	7	0	0	8	0
M202.2N	Mean	3.72	0.1	2.25	0.17	0.072	3.68	50.4	3.38	—	—	19.9	—
	Median	3.3	0.1	1.8	0.17	0.067	3.5	52	3.3	—	—	14.1	—
	Minimum	1.57	0.03	0.9	0.062	0.01	1.9	35.9	2.98	—	—	11	—
	Maximum	7.24	0.2	3.93	0.3	0.13	6.17	60.3	4.2	—	—	58.3	—
	Std. dev.	1.62	0.058	1.071	0.078	0.043	1.349	10.31	0.423	—	—	15.64	—
	N obs.	9	12	12	9	12	12	4	9	0	0	8	0
M203.5R	Mean	4.57	0.1	3.14	0.21	0.11	4.56	—	3.53	—	—	37	—
	Median	4.57	0.08	3.37	0.16	0.11	4.48	—	3.4	—	—	17.1	—
	Minimum	1.6	0.04	0.9	0.14	0.061	3.89	—	3.1	—	—	13.5	—
	Maximum	6.98	0.3	4.27	0.27	0.18	5.32	—	4.1	—	—	80.5	—
	Std. dev.	2.232	0.078	1.251	0.066	0.04	0.502	—	0.419	—	—	37.68	—
	N obs.	4	6	6	4	6	6	0	4	0	0	3	0
M206.0S	Mean	3.74	0.08	2.12	0.19	0.75	4.88	—	3.48	—	—	20.9	—
	Median	3.68	0.06	2.44	0.19	0.091	4.64	—	3.3	—	—	16.7	—
	Minimum	1.98	0.03	-0.01	0.11	0.034	3.89	—	3.1	—	—	14.5	—
	Maximum	5.13	0.1	3.9	0.29	4.74	5.78	—	4	—	—	31.5	—
	Std. dev.	1.186	0.042	1.346	0.067	1.76	0.652	—	0.386	—	—	9.232	—
	N obs.	5	6	7	5	7	6	0	4	0	0	3	0

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1993 Near-surface measurements:							
M206.1T	Mean	3.4	0.04	1.92	0.18	0.075	3.62	36.8	3.53	—	—	15.1	—
	Median	2.52	0.04	1.26	0.14	0.087	3.93	37.5	3.5	—	—	15.6	—
	Minimum	2.5	-0.02	0.12	0.12	-0.01	0.9	32.9	3	—	—	12.2	—
	Maximum	6.13	0.07	3.96	0.3	0.18	6.17	40.1	4	—	—	17.5	—
	Std. dev.	1.475	0.025	1.678	0.066	0.062	2.027	3.646	0.399	—	—	2.734	—
	N obs.	6	8	8	6	8	8	3	7	0	0	3	0
M235.5D	Mean	3.2	0.07	2.12	0.18	0.56	5.15	50	3.29	—	—	73.7	—
	Median	2.58	0.06	2.55	0.17	0.093	5.02	46.1	3.3	—	—	12.1	—
	Minimum	0.13	-0.02	-0.01	0.082	-0.01	3.9	44.6	2.64	—	—	9.86	—
	Maximum	6.11	0.1	4.37	0.32	4.8	6.39	56.3	4.42	—	—	334	—
	Std. dev.	1.947	0.048	1.866	0.071	1.49	0.827	5.551	0.533	—	—	128.3	—
	N obs.	8	9	10	8	10	9	4	8	0	0	6	0
M237.2G	Mean	4.41	0.1	2.74	0.19	0.4	4.41	47.4	3.36	—	—	20.1	—
	Median	4.5	0.05	2.59	0.17	0.11	4.31	47	3.2	—	—	17.1	—
	Minimum	2.57	-0.02	-0.01	0.084	-0.01	1.5	37.4	2.72	—	—	11.9	—
	Maximum	6.43	0.7	4.48	0.32	4.75	6.43	56.8	4.9	—	—	31.2	—
	Std. dev.	1.078	0.215	1.02	0.074	1.204	1.239	7.776	0.679	—	—	7.828	—
	N obs.	11	14	15	12	15	14	7	12	0	0	7	0
M241.4K	Mean	4.9	0.2	2.71	0.2	0.38	4.12	51.2	3.32	—	—	18.7	—
	Median	4.51	0.05	2.66	0.2	0.1	4.2	48.4	3.12	—	—	18.2	—
	Minimum	2.32	-0.02	-0.01	0.089	-0.01	0.65	37.8	2.42	—	—	15.6	—
	Maximum	8.33	0.9	4.7	0.37	4.74	6.37	67.5	5.1	—	—	21.9	—
	Std. dev.	1.815	0.27	1.31	0.076	1.164	1.506	9.356	0.768	—	—	2.119	—
	N obs.	12	15	16	13	16	15	8	13	0	0	7	0
MO02.0X	Mean	2.96	0.05	1.83	0.25	0.1	5.61	47.9	5.15	—	—	19.1	—
	Median	2.73	0.04	1.64	0.23	0.089	5.67	48.4	5.1	—	—	16.3	—
	Minimum	1.54	-0.02	0.79	0.14	0.067	4.35	31.6	4.3	—	—	9.16	—
	Maximum	3.81	0.1	2.84	0.44	0.19	6.73	58.8	5.92	—	—	29.7	—
	Std. dev.	0.718	0.039	0.688	0.103	0.036	0.596	11.69	0.613	—	—	6.577	—
	N obs.	10	12	12	10	12	12	4	9	0	0	8	0
PE01.8M	Mean	3.04	0.1	1.05	0.22	0.06	3.4	36.1	4.55	—	—	13	—
	Median	2.95	0.1	0.78	0.26	0.026	3.48	33	4.5	—	—	13.2	—
	Minimum	1.89	0.03	0.25	0.14	0.015	1.58	27.2	3.5	—	—	10	—
	Maximum	4.72	0.2	3.52	0.27	0.13	4.88	43.3	5.46	—	—	17	—
	Std. dev.	0.93	0.048	1.118	0.06	0.051	1.304	7.393	0.656	—	—	2.962	—
	N obs.	6	7	7	6	7	7	4	6	0	0	5	0

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1993 Near-surface measurements:							
PI00.2M	Mean	4.17	0.1	2.13	0.18	0.1	5.26	83.6	4.23	—	—	20.9	—
	Median	3.69	0.1	1.58	0.16	0.073	5.29	77.8	4.18	—	—	21.1	—
	Minimum	2.24	0.07	0.99	0.1	0.032	2.32	70.1	3	—	—	13.6	—
	Maximum	6.6	0.3	4.53	0.4	0.21	7.31	106	5.1	—	—	26.3	—
	Std. dev.	1.38	0.063	1.187	0.088	0.056	1.337	15.3	0.766	—	—	4.397	—
	N obs.	9	12	12	9	12	12	4	9	0	0	8	0
WD00.2M	Mean	4.06	0.2	2.58	0.38	0.2	5.46	76.8	4.61	—	—	32.8	—
	Median	3.11	0.1	2.24	0.25	0.18	5.27	69	4.6	—	—	22.1	—
	Minimum	2.37	-0.02	0.96	0.15	0.09	3.55	60.4	3.3	—	—	5.35	—
	Maximum	8.38	0.4	6.11	1.27	0.51	8.16	98.3	6.28	—	—	73.1	—
	Std. dev.	1.833	0.136	1.516	0.336	0.122	1.339	16.3	0.892	—	—	23.73	—
	N obs.	10	12	12	10	12	12	4	9	0	0	8	0
						1994 Near-surface measurements:							
CA00.4M	Mean	1.68	0.07	0.64	0.22	0.032	4.1	61.6	4.62	26	20.7	23.5	84.5
	Median	1.51	0.07	0.74	0.14	0.021	4.01	66.7	4.35	29.3	22	19.3	66.9
	Minimum	0.69	-0.02	-0.01	0.085	-0.01	1.94	14.3	2.05	3.42	6.52	5.99	21.7
	Maximum	4.38	0.2	1.64	0.59	0.11	5.83	86	11.1	40.1	33.5	41.2	183
	Std. dev.	0.813	0.058	0.504	0.157	0.034	1.038	20.53	1.943	10.16	7.133	10.02	43.78
	N obs.	18	19	19	18	20	20	20	20	19	19	20	19
CU11.6M	Mean	1.67	0.09	0.73	0.14	0.017	3.14	48.4	4.57	8.97	14.4	14	45.7
	Median	1.28	0.05	0.62	0.083	-0.01	3.15	47.3	4.38	9.35	13.8	13.9	30.5
	Minimum	0.82	-0.02	0.14	0.011	-0.01	1.12	24.6	2.7	3.75	6.05	5.44	8.45
	Maximum	3.45	0.4	1.81	0.52	0.066	4.61	66.8	8.37	14	24.5	22	232
	Std. dev.	0.861	0.115	0.58	0.137	0.017	1.025	14.16	1.28	2.896	4.608	4.646	56.25
	N obs.	16	16	16	16	17	17	17	17	17	17	17	17
DC01.0M	Mean	4.89	0.2	1.87	0.75	0.36	4.54	45.4	5.74	15	35	38.1	67.1
	Median	3.78	0.2	1.83	0.58	0.22	4.41	44	5.04	15.1	33.9	37.8	42
	Minimum	1.96	-0.02	-0.01	0.16	0.02	2.47	25.5	2.6	6.3	17.1	14.3	14.5
	Maximum	13	0.7	4.24	1.97	1.54	7.3	79.3	11.6	23.4	76.9	81.3	362
	Std. dev.	3.123	0.184	1.326	0.534	0.402	1.287	14.45	2.503	4.762	16.42	18.45	78.21
	N obs.	19	19	19	19	20	20	20	20	19	19	20	19

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1994 Near-surface measurements:													
I005.7M	Mean	3.5	0.1	2.86	0.23	0.083	2.85	58.3	4.14	26.1	31.2	50.6	70.6
	Median	3.43	0.09	2.79	0.24	0.045	2.56	59.9	4.02	26	29.2	52.4	71.9
	Minimum	1.6	-0.02	0.77	0.095	-0.01	1.05	41.1	2.46	22.3	12	37.2	47
	Maximum	5.15	0.4	5.25	0.36	0.24	4.12	70.2	6.15	33	50.6	59.1	85.8
	Std. dev.	1.122	0.13	1.583	0.093	0.084	1.087	8.971	1.246	3.429	13.05	6.844	11.25
	N obs.	9	8	8	9	9	9	9	9	9	9	9	9
I007.0W	Mean	4.42	0.1	3.05	0.22	0.072	2.31	55.2	4.08	24.2	35.8	50.9	62.9
	Median	3.84	0.08	3.37	0.22	0.055	1.9	55.8	4.26	23.4	40.4	50.6	63.4
	Minimum	2.14	-0.02	0.58	0.078	-0.01	0.1	24.6	1.71	9.79	10.6	22.5	30.9
	Maximum	16.7	0.8	5.29	0.37	0.2	4.02	79.2	7.05	32.5	55.2	83.8	89
	Std. dev.	3.235	0.179	1.37	0.077	0.054	1.095	13.53	1.221	6.22	13.86	15.9	14.95
	N obs.	19	18	18	19	19	19	19	19	19	19	19	19
M193.2F	Mean	2.24	0.06	1.43	0.24	0.056	4.55	53.9	5.57	17.6	39.7	21.1	117
	Median	1.81	0.02	1.13	0.17	0.043	4.3	53.4	5.76	17.9	38.7	19.5	114
	Minimum	0.71	-0.02	0.57	0.12	-0.01	2.76	27.3	3.55	9.84	20.7	9.71	31.4
	Maximum	6.89	0.4	3.17	0.6	0.17	7.74	84.8	7.4	24.1	64.3	46.6	202
	Std. dev.	1.352	0.094	0.769	0.147	0.041	1.281	12.03	1.118	3.123	12.94	8.31	39.92
	N obs.	18	19	19	18	20	20	20	20	19	19	20	19
M196.9Q	Mean	2.97	0.1	2.1	0.21	0.046	3.66	46.9	3.19	18.5	12.7	21	47.7
	Median	2.65	0.02	1.75	0.16	0.037	4.3	47.5	3.21	19.6	12.1	16.4	37.6
	Minimum	1.68	-0.02	0.86	0.07	-0.01	0.2	10.1	1.08	3.59	3.15	10	19
	Maximum	4.57	0.8	4.44	0.47	0.16	5.97	70.5	4.47	22.8	28.2	82.6	179
	Std. dev.	0.905	0.201	0.998	0.126	0.042	1.75	11.2	0.765	4.625	4.614	15.57	37.48
	N obs.	18	19	19	18	20	20	20	20	19	19	20	19
M201.7Q	Mean	2.51	0.08	1.69	0.14	0.028	2.65	45.4	3.2	18.5	12	16.1	39.3
	Median	2.47	0.02	1.98	0.11	0.024	2.46	44.7	3.12	19.8	11.6	15.3	34.2
	Minimum	1.34	-0.02	0.55	0.031	-0.01	0.51	28.3	2.13	7.99	5.02	2.08	4.17
	Maximum	4.31	0.5	2.82	0.4	0.074	5.32	61.9	4.23	25	24.5	30.9	125
	Std. dev.	0.797	0.142	0.78	0.091	0.025	1.48	8.474	0.599	4.314	3.552	6.384	24.82
	N obs.	20	19	19	20	20	20	20	20	20	20	20	19
M202.2N	Mean	2.35	0.1	1.33	0.13	0.02	2.47	45.7	3.22	19.3	12.6	16.8	37
	Median	2.13	0.04	1.11	0.099	0.013	1.98	43.8	3.15	20.2	11.6	15	35.4
	Minimum	1.2	-0.02	0.3	0.024	-0.01	0.27	26.9	1.95	7.96	6.69	8	15
	Maximum	3.8	0.4	2.47	0.39	0.069	5.25	62	4.56	23.4	25	35.6	63.8
	Std. dev.	0.718	0.131	0.785	0.093	0.018	1.598	9.639	0.648	3.832	4.029	6.099	11.57
	N obs.	18	19	19	18	20	20	20	20	20	20	20	19

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1994 Near-surface measurements:													
M203.5R	Mean	2.57	0.04	1.78	0.17	0.035	3.27	49.9	3.09	20	12.5	15.8	35.6
	Median	2.28	0.02	1.58	0.13	0.024	3.21	48.2	3.18	20.6	11.6	15.5	32.7
	Minimum	1.48	-0.02	0.62	0.074	-0.01	0.65	30	2.31	8.53	9.64	7.83	15.6
	Maximum	4.23	0.2	3.51	0.4	0.088	6.05	74.3	3.87	27.8	23.6	27.7	71.3
	Std. dev.	0.775	0.048	0.873	0.087	0.028	1.912	10.78	0.434	4.012	3.228	4.95	13.97
	N obs.	14	15	15	14	16	16	16	16	15	15	16	14
M206.0S	Mean	1.84	0.03	0.78	0.15	0.018	2.37	45.1	3.33	19.3	13.1	15.9	34.7
	Median	1.83	-0.02	0.67	0.12	0.012	2.16	44.1	3.33	20.1	11.3	16.2	33.9
	Minimum	1.08	-0.02	-0.01	-0.01	-0.01	0.62	24.9	2.28	6.15	5	6.42	12.1
	Maximum	3.63	0.2	2.63	0.38	0.06	4.27	77.7	4.2	32.7	37.7	23.4	48.2
	Std. dev.	0.596	0.049	0.628	0.107	0.016	1.111	12.84	0.464	5.78	7.32	3.733	8.772
	N obs.	17	16	16	17	17	17	17	17	17	17	17	16
M206.1T	Mean	1.68	0.05	0.42	0.26	0.016	3.31	53.7	4.17	20.9	12.4	16.1	33.5
	Median	1.72	-0.02	0.15	0.19	-0.01	2.86	54.4	4.12	18.4	12.1	16	29.8
	Minimum	0.71	-0.02	-0.01	0.084	-0.01	1.49	27.7	3.18	7.46	7.58	7.17	14.4
	Maximum	2.44	0.2	1.21	0.76	0.069	6	62.8	5.34	56.2	22.4	24.2	61
	Std. dev.	0.54	0.06	0.495	0.185	0.02	1.471	9.587	0.669	12.21	3.751	4.394	12.52
	N obs.	11	10	10	11	11	11	11	11	11	11	11	10
M235.5D	Mean	1.97	0.1	0.6	0.24	0.015	2.51	44.1	4.36	13.2	8.17	10.9	33.1
	Median	1.69	0.1	0.19	0.18	0.012	2.42	41.4	4.59	12	6.04	7.98	25.3
	Minimum	0.73	-0.02	-0.01	0.059	-0.01	-0.05	25.3	2.8	5.99	1	5.42	4.65
	Maximum	3.74	0.5	3.75	0.65	0.039	4.42	78.2	5.52	32.8	37.5	31.2	146
	Std. dev.	0.78	0.162	1.069	0.148	0.011	1.39	11.21	0.853	5.659	7.953	7.201	31.35
	N obs.	16	15	15	16	17	17	17	17	17	17	17	16
M237.2G	Mean	2.86	0.1	2.02	0.21	0.056	3.79	45.8	3.19	18.6	10.6	16.3	53.2
	Median	2.8	0.03	1.92	0.16	0.039	3.93	47.2	3.09	19.8	10.7	15.8	32.9
	Minimum	1.04	-0.02	-0.01	0.054	-0.01	0.6	22	1.74	4.08	6.35	5.49	9.36
	Maximum	4.84	0.7	4.56	0.75	0.18	6.27	56.3	4.5	23.2	12.8	35.4	315
	Std. dev.	0.979	0.176	1.193	0.16	0.053	1.806	7.925	0.656	4.381	1.615	5.84	67.63
	N obs.	18	17	17	18	19	19	19	19	19	19	19	19
M241.4K	Mean	2.98	0.09	2.06	0.21	0.054	3.7	48.8	3.18	20.3	11.3	18	45.6
	Median	2.94	-0.02	1.87	0.17	0.041	4.23	48.3	3.18	21.1	11	15.8	33.8
	Minimum	1.18	-0.02	0.6	0.082	-0.01	0.39	35.2	2.28	13.3	6.5	11.6	29.1
	Maximum	5.16	0.6	4.12	0.46	0.17	6.22	71.8	4.65	25.5	15	37	127
	Std. dev.	1.069	0.175	1.042	0.104	0.044	1.947	7.39	0.643	2.694	1.767	6.171	24.85
	N obs.	17	17	17	17	19	19	19	19	19	19	19	19

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1994 Near-surface measurements:													
MO02.0X	Mean	1.86	0.05	1.3	0.25	0.048	4.75	54.6	5.7	18.6	41.3	19.6	120
	Median	1.73	-0.02	1.12	0.15	0.046	4.34	54.3	5.91	18.5	38	18.5	109
	Minimum	0.92	-0.02	0.52	0.094	-0.01	2.87	15.4	3.9	9.08	21.9	9.1	31.3
	Maximum	3.12	0.5	2.41	1.02	0.11	7.93	83.8	7.7	36.1	64.9	47.2	221
	Std. dev.	0.657	0.104	0.604	0.242	0.03	1.274	15.32	1.19	5.648	14.09	8.592	45.57
	N obs.	17	19	19	18	20	20	20	20	19	19	20	19
PE01.8M	Mean	1.5	0.05	0.66	0.12	0.013	3.36	50.7	4.26	11.6	21.2	21.5	25.1
	Median	1.32	0.05	0.65	0.087	-0.01	2.95	49.8	4.38	11.8	19.6	19.2	24.3
	Minimum	0.85	-0.02	-0.01	0.053	-0.01	1.68	10.3	2.37	1.55	2.62	4.95	7.2
	Maximum	3.79	0.1	1.34	0.29	0.044	7.73	84.1	5.76	31.5	60.7	66.2	75.8
	Std. dev.	0.792	0.034	0.394	0.069	0.011	1.342	15.02	1.046	5.86	11.75	12.92	14.87
	N obs.	17	17	17	17	19	19	18	18	17	17	19	18
PI00.2M	Mean	2.18	0.1	1.29	0.2	0.038	3.53	59.6	4.08	24.7	20.1	24.1	65.9
	Median	2.06	0.08	1.29	0.12	0.024	3.38	55.3	3.87	22.2	20.7	22.9	48.1
	Minimum	0.96	-0.02	0.54	0.05	-0.01	1	24.9	1.95	7.05	7.93	10.7	15.6
	Maximum	5.3	0.3	2.57	1.33	0.18	5.99	90.4	10.3	39.3	28	43.2	195
	Std. dev.	1.035	0.104	0.507	0.282	0.042	1.339	18.54	1.778	8.453	5.126	8.096	41.13
	N obs.	19	19	19	19	20	20	20	20	20	20	20	19
WD00.2M	Mean	2.3	0.3	1.58	0.33	0.2	3.86	76.9	4.55	32.8	29.5	50.3	175
	Median	1.59	0.08	0.77	0.16	0.097	3.57	85.8	3.87	38.6	32.1	49.1	143
	Minimum	1.17	-0.02	0.71	0.088	0.027	0.083	42.8	2.5	11.2	4.18	13.7	48.5
	Maximum	5.6	0.9	4.49	1	0.81	7.38	98	7.59	45.9	42.5	83	286
	Std. dev.	1.666	0.32	1.462	0.342	0.302	2.358	22.58	1.848	14.01	14.77	23.04	96.52
	N obs.	6	6	6	6	6	6	6	6	6	6	6	6
1995 Near-surface measurements:													
CA00.4M	Mean	2.23	0.1	0.88	0.25	0.043	4.13	64	4.78	26.1	20.8	23.4	75.9
	Median	1.83	0.1	0.35	0.15	0.02	3.89	64.6	4.44	27.4	21.1	24.3	66.6
	Minimum	0.87	-0.02	0.051	0.058	-0.01	1.11	24.7	3.42	8.58	9.79	12.9	22.4
	Maximum	4.68	0.5	3.86	1.55	0.39	6.73	83.5	7.14	39.2	32.7	38.2	153
	Std. dev.	0.978	0.11	0.991	0.335	0.081	1.648	16.45	1.018	7.987	6.54	6.599	35
	N obs.	24	24	24	24	23	22	24	24	24	24	22	22

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1995 Near-surface measurements:													
CU11.6M	Mean	2.19	0.1	0.85	0.2	0.034	3.53	47.8	4.25	9.03	12.7	14	29.6
	Median	1.94	0.1	0.78	0.091	0.013	3.68	52.1	4.05	8.71	12.7	11.8	24.7
	Minimum	1.05	-0.02	0.02	0.02	-0.01	0.35	22.2	2.85	3.78	5.32	4.94	9.53
	Maximum	4.99	0.3	2.19	1.61	0.17	5.27	67.9	6.33	25.3	23.6	37	61.4
	Std. dev.	1.171	0.074	0.667	0.353	0.046	1.597	14.61	1.012	4.805	4.646	8.434	14.35
	N obs.	19	19	19	19	19	18	19	19	19	19	18	18
DC01.0M	Mean	5.27	0.1	3.71	0.7	0.47	4.1	45.5	5.17	15.5	38.9	45.8	57.9
	Median	3.99	0.1	2.65	0.39	0.19	4.07	44.6	4.5	15	30.9	38.8	41.8
	Minimum	1.63	-0.02	0.13	0.13	0.028	-0.05	13.2	2.4	3.13	6.51	6.59	-0.01
	Maximum	11	0.5	10.6	2.47	1.84	7.1	72.8	8.64	26.4	103	98.4	193
	Std. dev.	3.022	0.103	2.952	0.635	0.534	1.77	15	1.561	6.765	25.21	28.32	47.18
	N obs.	23	24	24	23	24	23	24	24	24	24	23	23
I005.7M	Mean	3.98	0.09	2.98	0.28	0.088	2.16	58.1	3.74	25.6	30.6	54.2	69.7
	Median	3.89	0.05	2.66	0.26	0.072	2.16	56.2	3.75	25.7	34.6	51.9	60.4
	Minimum	2.42	0.02	1.1	0.12	-0.01	0.24	49.6	2.73	21.5	14	27.5	43.8
	Maximum	6.44	0.3	5.35	0.58	0.22	3.92	78.5	4.5	33.6	46.5	112	152
	Std. dev.	1.071	0.073	1.304	0.13	0.072	1.194	7.326	0.516	2.892	10.95	24	28.17
	N obs.	13	13	13	13	13	13	13	13	13	13	13	13
I007.0W	Mean	5.26	0.09	3.68	0.3	0.1	2.72	63.7	3.9	27.2	34.2	56.7	68.4
	Median	4.93	0.06	3.82	0.24	0.1	2.67	62	3.84	26.7	36.4	58.5	65.4
	Minimum	2.34	0.03	1.14	0.13	-0.01	0.65	5.02	3.12	2.03	1.36	26.7	40.7
	Maximum	19.3	0.3	5.73	0.94	0.21	4.06	93.4	4.95	37.4	57.8	91.8	99.1
	Std. dev.	3.315	0.064	1.451	0.186	0.044	0.894	15.77	0.481	6.604	11.86	16.53	14.7
	N obs.	24	24	24	24	24	23	24	24	24	24	23	23
M193.2F	Mean	2.65	0.05	1.57	0.24	0.053	4.86	56.9	5.36	19.6	37.1	21.4	96.5
	Median	2.48	0.04	1.42	0.23	0.045	5.18	57.7	5.07	20.8	33	20.5	72.4
	Minimum	1.32	0.03	0.61	0.065	0.019	1.6	42.5	3.51	12.5	13.1	11	-0
	Maximum	4.76	0.1	3.75	1.02	0.16	6.36	73.6	8.9	26.1	72.4	43.3	205
	Std. dev.	0.845	0.03	0.765	0.191	0.028	1.155	8.179	1.247	3.616	15.83	7.374	56.51
	N obs.	25	25	25	25	24	23	25	25	25	25	23	23
M196.9Q	Mean	3.44	0.05	2.57	0.19	0.055	4.33	51.4	3.12	21	13.2	19.1	41.5
	Median	3.46	0.04	2.73	0.18	0.056	4.6	51.5	3.15	21.7	12.5	17.8	39.6
	Minimum	1.44	-0.02	0.71	0.073	-0.01	0.91	21.4	2.13	10.6	5.02	9.51	27.5
	Maximum	6.33	0.1	4.46	0.33	0.2	6.13	71.1	4.26	28.3	21.3	31.4	96.9
	Std. dev.	1.161	0.031	1.126	0.073	0.04	1.283	10.47	0.589	4.257	4.255	5.388	15.09
	N obs.	25	25	25	25	24	23	25	25	25	25	23	23

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1995 Near-surface measurements:													
M201.7Q	Mean	2.84	0.05	1.93	0.14	0.03	3.5	49.5	3.33	20.4	11.6	17.1	37.6
	Median	2.79	0.04	1.83	0.13	0.024	3.9	49.4	3.18	19.8	10.9	16.4	36.1
	Minimum	1.41	-0.02	0.61	0.075	-0.01	0.62	36.6	1.89	15.4	7.9	11.6	24.8
	Maximum	4.83	0.2	3.83	0.31	0.075	5.73	60.9	4.89	25.3	16.5	23.5	53.7
	Std. dev.	0.835	0.036	0.902	0.054	0.021	1.673	7.133	0.761	3.074	2.478	3.482	7.771
	N obs.	22	22	22	22	22	21	22	22	22	22	21	21
M202.2N	Mean	2.7	0.05	1.53	0.13	0.028	3.36	49	3.34	20.1	11.9	16.8	36.7
	Median	2.69	0.06	1.66	0.14	0.021	3.75	49.6	3.3	19.7	11.7	16	36.2
	Minimum	1.57	-0.02	-0.01	0.062	-0.01	0.23	38.5	2.34	15.4	7.81	11.3	20.7
	Maximum	4.08	0.2	2.95	0.22	0.073	5.79	60.7	5.61	24.9	16.9	23.7	49.8
	Std. dev.	0.712	0.041	0.913	0.047	0.02	1.695	6.544	0.752	2.905	2.672	3.821	6.883
	N obs.	21	21	21	21	21	20	21	21	21	21	20	20
M202.6T	Mean	3.01	0.05	2.01	0.16	0.061	4.64	48.6	3.06	20.6	11.8	16.8	40.7
	Median	2.75	0.03	1.65	0.14	0.054	4.88	47.7	3.03	20.2	11.1	16.3	41.2
	Minimum	1.49	-0.02	0.69	0.079	0.012	1.68	34.2	1.92	10.4	6.58	7.87	27.7
	Maximum	4.97	0.2	4.12	0.27	0.11	5.9	63.6	5.01	27.8	17.6	30.5	56.2
	Std. dev.	1.053	0.042	1.114	0.055	0.026	1.118	9.617	0.855	5.139	2.92	5.456	8.855
	N obs.	16	16	16	16	16	15	16	16	16	16	15	15
M203.5R	Mean	3.13	0.04	2.09	0.17	0.045	4.3	50.8	3.06	21	15.1	17.9	39.7
	Median	2.8	0.03	2.37	0.17	0.045	4.64	51.1	2.94	21.5	12.4	16.1	41.9
	Minimum	1.47	-0.02	0.63	0.096	-0.01	2.06	34.2	1.8	15.2	7.41	1.77	3.06
	Maximum	7.15	0.1	4.26	0.29	0.095	5.88	62.6	5.28	27.1	64.4	31.4	53
	Std. dev.	1.433	0.03	1.053	0.057	0.025	1.213	8.887	0.817	4.022	13.07	7.212	12.07
	N obs.	16	17	17	16	17	16	17	17	17	17	16	16
M206.0S	Mean	2.31	0.04	0.92	0.16	0.022	3.08	48.6	3.68	20.1	13.4	15.7	37.3
	Median	1.96	0.03	0.29	0.17	0.014	3.48	47.4	3.66	19.6	11	15.5	37.2
	Minimum	1.22	-0.02	-0.01	0.037	-0.01	-0.05	37.6	2.28	14.7	7.67	11.1	26.4
	Maximum	4.58	0.1	4.29	0.28	0.069	5.9	63.1	6.09	29	54	19.5	55.4
	Std. dev.	1.021	0.037	1.233	0.066	0.019	2.011	6.652	0.864	3.359	8.934	2.726	6.764
	N obs.	24	24	24	24	24	23	24	24	24	24	23	23
M206.1T	Mean	1.62	0.04	0.42	0.13	0.018	2.38	57.2	5.55	18.5	10.3	14.3	38.7
	Median	1.43	0.04	0.14	0.13	-0.01	1.24	55.9	5.34	17.6	8.8	13.3	37.3
	Minimum	0.84	-0.02	-0.01	0.054	-0.01	0.51	42.6	4.56	14.4	7.04	9.02	25.3
	Maximum	2.92	0.09	2.15	0.18	0.057	7.44	75.5	7.56	25.5	13.8	22.6	55.7
	Std. dev.	0.713	0.027	0.745	0.034	0.02	2.287	9.993	0.878	3.91	2.646	4.161	8.44
	N obs.	12	12	12	12	11	11	12	12	12	12	11	11

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1995 Near-surface measurements:													
M235.5D	Mean	2.43	0.1	0.46	0.27	0.016	2.37	47.6	3.55	14.9	7.42	10.3	35
	Median	2.45	0.04	0.13	0.21	-0.01	2.15	49.2	3.57	14.9	7.32	12.4	29.8
	Minimum	1.13	-0.02	-0.01	0.075	-0.01	-0.05	20.1	2.31	3.55	2.49	-0.01	0
	Maximum	4.41	0.6	3.47	1.07	0.071	6.26	64.6	4.95	22.3	14.5	17.5	88.4
	Std. dev.	0.867	0.178	0.913	0.222	0.02	1.974	10.34	0.668	4.595	3.049	4.957	18.03
	N obs.	23	24	24	23	24	23	24	24	24	24	23	23
M237.2G	Mean	3.77	0.05	2.42	0.2	0.052	4.54	45.8	3.24	18.1	10.1	16.2	34.7
	Median	3.07	0.04	1.93	0.19	0.043	4.67	48.5	3.15	18.8	9.18	15.9	34.7
	Minimum	1.89	-0.02	0.39	0.099	-0.01	1.54	-0.01	1.98	0.063	1.62	9.22	17.6
	Maximum	8.94	0.2	4.88	0.4	0.12	6.01	59.2	5.28	27.2	15.9	28.3	48.7
	Std. dev.	1.936	0.038	1.487	0.061	0.032	1.103	14.08	0.686	6.587	3.226	4.627	7.587
	N obs.	19	20	20	19	20	19	20	20	20	20	19	19
M241.4K	Mean	3.49	0.04	2.5	0.17	0.047	4.22	51.9	3.21	22.3	12.1	17.6	36.5
	Median	3.37	0.03	2.51	0.18	0.049	4.16	52.3	3	22.5	12.3	17.4	36.6
	Minimum	1.62	-0.02	0.7	0.059	-0.01	0.76	35.9	2.04	16.8	7.43	1.57	3.99
	Maximum	6.47	0.1	5.02	0.28	0.1	6.44	66.7	6.78	28	18.2	27.3	56.2
	Std. dev.	1.333	0.028	1.303	0.062	0.031	1.539	8.259	1.165	3.317	2.962	5.523	12.15
	N obs.	21	23	23	21	23	22	23	23	23	23	22	22
MO02.0X	Mean	2.19	0.05	1.19	0.31	0.046	5.33	59.8	5.74	19.2	47.3	20.7	131
	Median	1.81	0.05	1.11	0.18	0.047	5.47	62.1	5.55	20	47.4	20.8	106
	Minimum	-0.1	0.02	0.57	-0.01	0.017	0.91	45.3	4.14	12.7	19.1	10.2	-0
	Maximum	4.24	0.2	1.96	1.09	0.085	6.68	73.4	10.2	25.5	75.2	39.8	226
	Std. dev.	0.982	0.035	0.418	0.308	0.015	1.131	8.72	1.226	3.984	16.8	7.083	68.7
	N obs.	25	25	24	25	24	23	25	25	25	25	23	23
PE01.8M	Mean	1.5	0.08	0.46	0.19	0.026	3.26	50.5	3.92	11.6	21.1	25.4	33.8
	Median	1.51	0.06	0.43	0.13	0.014	3.48	50.2	3.84	10.8	20	22.1	26.3
	Minimum	0.44	-0.02	-0.01	0.034	-0.01	0.72	3.06	2.97	0.47	0.45	4.92	8.61
	Maximum	2.93	0.3	1.15	1.55	0.17	4.79	81.9	4.71	21.8	38.1	79	77.8
	Std. dev.	0.639	0.071	0.423	0.296	0.035	1.09	18.06	0.5	4.939	8.802	14.75	19.56
	N obs.	24	24	24	24	24	23	24	24	24	24	23	23
PI00.2M	Mean	2.69	0.1	1.41	0.21	0.05	4.12	63.6	4.26	25.2	19.3	26.6	57.1
	Median	2.17	0.09	0.93	0.13	0.038	4.21	60.4	4.11	24	17.9	24.9	51.7
	Minimum	0.98	-0.02	0.35	0.044	-0.01	1.36	27.7	2.79	8.57	9.96	8.7	18.7
	Maximum	5.5	0.3	4.09	1.4	0.16	6.25	90.5	6.51	36.6	48.4	64.3	92.6
	Std. dev.	1.26	0.082	1.078	0.278	0.041	1.208	16.09	1.077	6.734	7.598	11.74	18.55
	N obs.	22	22	22	22	22	21	22	22	22	22	21	21

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1995 Near-surface measurements:							
WD00.2M	Mean	4.75	0.7	3.15	0.66	0.48	5.43	68.9	6.88	28.1	41.5	57.6	111
	Median	3.97	0.3	2.64	0.37	0.19	5.32	64.9	5.58	25.9	30.8	50	105
	Minimum	1.29	0.04	0.4	0.1	0.024	2.13	43.9	3.27	17	14	17.6	45.2
	Maximum	9.38	3.3	5.81	2.06	1.45	8.01	101	26.6	40.9	79.2	138	228
	Std. dev.	2.327	0.93	1.647	0.575	0.489	1.663	13.73	5.126	6.142	21.05	34.88	47.04
	N obs.	18	18	18	18	17	16	18	18	18	18	16	16
						1996 Near-surface measurements:							
CA00.4M	Mean	2.33	0.2	0.93	0.45	0.054	3.43	58.3	5.65	23.3	23.7	35.3	75.8
	Median	2.02	0.1	0.76	0.16	0.021	3.54	54.1	5.25	22.2	20.4	24.5	55.5
	Minimum	0.8	-0.02	-0.01	0.09	-0.01	0.72	18.3	3.12	5.24	9.63	9.36	16.9
	Maximum	6.57	0.6	2.52	2.38	0.26	5.36	89.2	9.27	42.7	58.4	99.1	238
	Std. dev.	1.329	0.161	0.808	0.644	0.07	1.171	19.39	1.327	9.601	11.57	25.51	50.68
	N obs.	21	17	22	14	22	22	22	22	22	22	22	22
CU11.6M	Mean	2.72	0.1	1.38	0.46	0.038	3.03	41.1	5.56	7.04	12.2	15.5	21.8
	Median	2.36	0.08	1.16	0.26	0.022	3.34	41.5	5.4	7.09	13	14.9	18.4
	Minimum	0.87	-0.02	0.37	0.022	-0.01	-0.05	19.3	3	3.09	5.29	8.34	11.1
	Maximum	5.66	0.3	3.21	1.11	0.14	4.43	63.6	9	11.3	17.5	22.9	36.7
	Std. dev.	1.455	0.099	0.863	0.435	0.036	1.207	13.92	1.383	2.409	4.543	5.236	9.812
	N obs.	14	11	15	10	15	15	15	15	15	15	15	15
DC01.0M	Mean	3.33	0.5	1.31	0.52	0.47	4.7	46.4	7.1	15.6	52.2	68.6	49.2
	Median	2.24	0.2	0.67	0.38	0.4	5.24	43.2	6.63	14.3	42.5	50.3	53.1
	Minimum	1.32	0.03	0.077	0.16	0.017	1.4	20.8	3.12	5.34	6.81	9.6	12.4
	Maximum	12.5	2.5	6.04	1.56	1.55	8.06	74.5	14.3	28.2	213	369	91.4
	Std. dev.	2.541	0.542	1.493	0.388	0.411	1.826	14.63	2.775	6.554	45.34	76.5	24.24
	N obs.	23	20	23	14	23	23	23	23	23	23	23	23
I005.7M	Mean	3.77	0.06	2.52	0.3	0.054	1.75	62.6	4.72	27.5	38	61.7	59.6
	Median	3.62	0.05	2.31	0.24	0.05	1.88	60.2	4.5	25.4	38.8	59.9	54.5
	Minimum	0.68	-0.02	-0.01	0.14	-0.01	-0.05	33.7	3.75	15.9	12.5	22.2	26.4
	Maximum	5.64	0.2	5.02	0.76	0.14	2.89	151	6.15	69.2	92.5	125	123
	Std. dev.	1.399	0.057	1.521	0.172	0.034	0.925	27.62	0.708	12.36	23.34	33.86	28.65
	N obs.	15	10	15	11	15	15	15	15	15	15	15	15

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1996 Near-surface measurements:													
I007.0W	Mean	4.47	0.1	3.35	0.33	0.12	2.22	60.9	4.82	24.3	40	63.1	62
	Median	4.23	0.05	3.18	0.27	0.1	2.39	63.6	4.59	24.8	45.3	68.9	61.1
	Minimum	2.15	-0.02	1.51	0.14	0.031	0.83	26.5	3.18	9.71	11.5	21.7	26.5
	Maximum	12.9	0.6	6.65	0.75	0.24	3.7	81.6	7.29	36.6	69.3	116	109
	Std. dev.	2.244	0.192	1.331	0.148	0.058	0.736	13.78	1.061	6.264	19.41	29.79	20.83
	N obs.	22	18	23	14	23	23	23	23	23	23	23	23
M193.2F	Mean	2.68	0.08	1.61	0.36	0.044	4.46	53.2	5.54	17.9	34.6	26.6	84.9
	Median	2.7	0.02	1.67	0.25	0.04	4.52	53.2	5.49	17.8	35.1	18.8	90.9
	Minimum	1.17	-0.02	0.58	0.055	-0.01	2.76	27.5	3.12	9.36	21.1	12.3	40.6
	Maximum	5.61	0.3	3	1.38	0.15	6.48	73.8	7.68	27.2	56.8	185	129
	Std. dev.	1.077	0.092	0.668	0.365	0.031	1.026	10.24	0.975	4.154	9.15	33.5	25.67
	N obs.	24	20	25	15	25	25	25	25	25	25	25	25
M196.9Q	Mean	3.07	0.1	2.19	0.22	0.047	3.55	48.5	3.86	19.6	13.2	22.4	32.9
	Median	3.23	0.05	2.17	0.19	0.034	3.62	46.3	3.93	20.1	12.1	21.3	30.5
	Minimum	1.21	-0.02	0.63	0.077	0.012	0.12	21.4	2.1	9.3	5.09	11.6	18.6
	Maximum	4.37	0.5	3.9	0.48	0.2	6.14	64.5	5.4	28.8	22.7	36.2	56.6
	Std. dev.	0.982	0.146	0.994	0.12	0.039	1.769	10.82	0.744	4.93	4.673	6.946	9.949
	N obs.	25	21	26	17	26	26	26	26	26	26	26	26
M201.7Q	Mean	2.83	0.09	2	0.17	0.039	3.13	45.5	4.18	18.2	11.2	20.2	28.2
	Median	3.11	0.04	1.96	0.14	0.028	3.07	45.1	4.05	19.2	12	20.7	28.3
	Minimum	1.19	-0.02	0.6	0.085	-0.01	0.48	20.1	2.55	9.05	5.14	9.81	1.09
	Maximum	4.24	0.5	4.72	0.56	0.21	5.83	63	10.1	26.3	17	31	54.3
	Std. dev.	0.976	0.113	1.038	0.115	0.043	1.472	9.796	1.417	4.046	3.634	5.223	9.203
	N obs.	24	20	25	15	25	25	25	25	25	25	25	25
M202.2N	Mean	2.6	0.05	1.77	0.16	0.028	2.95	45.1	3.88	18.2	11	19.9	29.8
	Median	2.74	0.04	1.75	0.13	0.016	2.99	44.8	3.75	19.5	12	20.5	28.4
	Minimum	0.99	-0.02	0.54	0.077	-0.01	0.59	19.5	2.58	9.24	4.86	10.8	17.7
	Maximum	3.87	0.2	3.08	0.29	0.077	5.35	62.8	5.13	26.7	17.5	29.9	56.4
	Std. dev.	0.908	0.052	0.839	0.06	0.023	1.204	10.78	0.736	4.416	3.697	5.015	8.005
	N obs.	24	18	24	16	24	24	24	24	24	24	24	24
M202.6T	Mean	2.97	0.1	2.1	0.26	0.049	3.53	44.6	3.91	17.7	10.9	19.5	29.2
	Median	3.01	0.04	2.03	0.19	0.036	3.87	43.4	3.93	18.6	10.1	19.6	27.3
	Minimum	0.86	-0.02	0.71	0.12	-0.01	0.11	20	2.7	8.74	4.96	10.8	16.7
	Maximum	4.58	0.6	4	0.71	0.21	6.15	62.5	5.19	23.9	16	29.7	50.4
	Std. dev.	1.124	0.15	1.021	0.192	0.042	1.761	11.2	0.698	4.39	3.199	5.141	7.077
	N obs.	24	19	24	15	24	24	24	24	24	24	24	24

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1996 Near-surface measurements:													
M203.5R	Mean	2.97	0.1	2.07	0.23	0.048	3.88	46.9	3.82	18.9	11.6	20	30.6
	Median	3.09	0.05	2.09	0.16	0.038	4.23	46.6	3.9	19.1	11.4	20	29.1
	Minimum	1.44	-0.02	0.65	0.078	-0.01	0.19	20.4	2.37	8.85	5.2	10.8	14.5
	Maximum	4.22	0.5	3.63	0.7	0.24	6.08	64.1	5.64	28.9	16.9	27.7	56
	Std. dev.	0.887	0.152	0.844	0.172	0.051	1.624	10.85	0.908	4.904	2.863	4.909	10.03
	N obs.	20	16	20	15	20	20	20	20	20	20	20	20
M206.0S	Mean	1.98	0.02	0.61	0.19	0.015	1.74	42.8	3.89	18.1	10.6	18.7	29.3
	Median	1.96	-0.02	0.21	0.17	-0.01	1.6	42.5	3.93	19	9.99	19.1	26.3
	Minimum	0.89	-0.02	-0.01	0.023	-0.01	-0.05	20	2.31	8.39	5.01	9.29	14.2
	Maximum	3.46	0.07	2.78	0.46	0.048	5.06	66.3	4.86	27.5	15.6	31.7	59.7
	Std. dev.	0.804	0.016	0.783	0.119	0.015	1.387	10.4	0.756	4.925	3	4.896	10.49
	N obs.	23	18	23	14	23	23	23	23	23	23	23	23
M206.1T	Mean	1.86	0.07	0.34	0.15	0.033	4.35	59.9	6.34	19	9.39	17.3	23.8
	Median	1.66	-0.02	-0.01	0.13	0.01	2.38	64.5	6.18	19.2	8.54	18.1	20
	Minimum	0.43	-0.02	-0.01	0.043	-0.01	-0.05	36	2.82	10.7	5.76	9.26	1.11
	Maximum	3.27	0.5	2.33	0.29	0.17	12.7	88.6	10.2	28.7	16.1	22.5	51.7
	Std. dev.	0.838	0.135	0.747	0.076	0.045	4.607	14.54	1.898	5.294	2.738	4.36	14.97
	N obs.	17	12	17	12	17	17	17	17	17	17	17	17
M235.5D	Mean	2.77	0.3	0.84	0.38	0.015	2.41	44.4	4.57	13.2	6.24	12.7	24.8
	Median	2.55	0.2	0.21	0.26	-0.01	2.73	43.7	4.38	12.6	5.3	11.4	19.1
	Minimum	1.06	-0.02	-0.01	0.11	-0.01	0.86	20.2	3.3	3.6	3.63	7.46	1.06
	Maximum	5.74	1.1	2.93	1.03	0.053	3.79	64.8	6.12	21.6	9.52	18.9	58.7
	Std. dev.	1.231	0.355	1.083	0.298	0.017	0.985	13.02	0.774	4.63	1.952	3.52	15.02
	N obs.	14	9	14	10	14	14	14	14	14	14	14	14
M237.2G	Mean	3.49	0.1	2.48	0.37	0.057	3.93	44.3	4.08	16.9	10.4	17.8	27.5
	Median	3.22	0.05	2.29	0.23	0.038	3.8	45.1	4.08	16.9	10.2	18.3	26.7
	Minimum	1.29	-0.02	0.55	0.13	0.019	0.38	18	2.85	2.87	5.01	7.45	8.96
	Maximum	6.75	0.5	4.34	1.22	0.25	6.26	61.4	5.7	25	18.3	27.6	46.3
	Std. dev.	1.317	0.157	0.968	0.348	0.053	1.439	11.82	0.773	5.379	3.097	5.419	8.257
	N obs.	17	13	18	11	18	18	18	18	18	18	18	18
M241.4K	Mean	2.85	0.08	1.86	0.23	0.044	4.13	44.2	3.74	18.6	10.4	18.8	27.1
	Median	2.82	0.04	1.84	0.22	0.034	3.62	42.3	3.66	19.1	10.3	19.4	25
	Minimum	1.31	-0.02	0.23	0.097	0.01	0.14	20.2	1.71	9.13	5.2	9.55	18.1
	Maximum	4.57	0.5	4.06	0.48	0.19	20.3	63.7	5.61	27.4	17.9	32	45.9
	Std. dev.	1.024	0.142	1.007	0.097	0.04	3.943	10.6	0.902	4.363	2.882	4.685	6.521
	N obs.	22	17	22	14	22	22	22	22	22	22	22	22

Table E-2. Continued.

Sampling location	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1996 Near-surface measurements:													
MO02.0X	Mean	2.35	0.07	1.21	0.38	0.038	4.87	52.4	6.41	16.3	42.8	18.8	113
	Median	2.1	0.02	1.22	0.21	0.039	5.02	53.1	6.42	15.8	41.6	18.2	103
	Minimum	0.7	-0.02	0.5	0.082	-0.01	3.41	23.4	3.69	7.69	21	10.4	54.8
	Maximum	4.5	0.3	2.83	1.52	0.072	7.02	83.2	8.52	26.6	65.2	29.1	196
	Std. dev.	1.013	0.084	0.482	0.423	0.018	1.058	13.69	1.08	4.591	10.85	4.637	35.54
	N obs.	24	20	25	16	25	25	25	25	25	25	25	25
PE01.8M	Mean	1.48	0.08	0.35	0.16	0.019	2.32	46.8	4.6	9.89	19.9	32.4	25.4
	Median	1.31	0.05	0.27	0.092	-0.01	2.79	47.5	4.74	9.28	17.7	26.6	21.8
	Minimum	0.8	-0.02	-0.01	0.033	-0.01	-0.05	21.5	3.03	4.83	9.52	13.5	11.8
	Maximum	3.92	0.2	0.99	0.49	0.23	4.54	66.3	6.81	15.2	34	66.3	70.6
	Std. dev.	0.801	0.066	0.28	0.147	0.048	1.329	12.28	1.007	3.133	7.911	15.44	12.57
	N obs.	21	20	21	12	21	21	21	21	21	21	21	21
PI00.2M	Mean	2.77	0.2	1.63	0.38	0.069	3.55	55.5	5.08	21.1	16.4	25.7	49.9
	Median	2.49	0.2	1.36	0.16	0.029	3.5	53.4	4.77	20.3	16.8	25.5	44.5
	Minimum	0.84	-0.02	0.28	0.08	-0.01	1.06	20.9	2.94	5.73	9.18	7.47	15.6
	Maximum	6.82	0.7	5.73	2	0.43	5.72	97.7	9.9	38.4	26	41.5	102
	Std. dev.	1.552	0.182	1.166	0.516	0.097	1.171	19.4	1.407	8.01	5.021	7.78	20.68
	N obs.	25	20	25	16	25	25	25	25	25	25	25	25
WD00.2M	Mean	4.16	0.7	2.35	0.53	0.27	4.05	59.6	6.11	23.1	33.5	46.6	81.4
	Median	3.69	0.3	1.93	0.36	0.11	3.61	57.9	6	22	26	34.2	54.2
	Minimum	1.76	-0.02	0.93	0.11	0.052	2.2	22.9	4.41	6.68	12.8	9.43	20.7
	Maximum	7.18	2.4	5.11	1.92	1.03	6.27	88	8.31	38.4	82.9	95.9	159
	Std. dev.	1.416	0.805	1.258	0.533	0.296	1.405	21.11	1.08	9.461	21.98	29.37	46.07
	N obs.	14	9	14	12	14	14	14	14	14	14	14	14

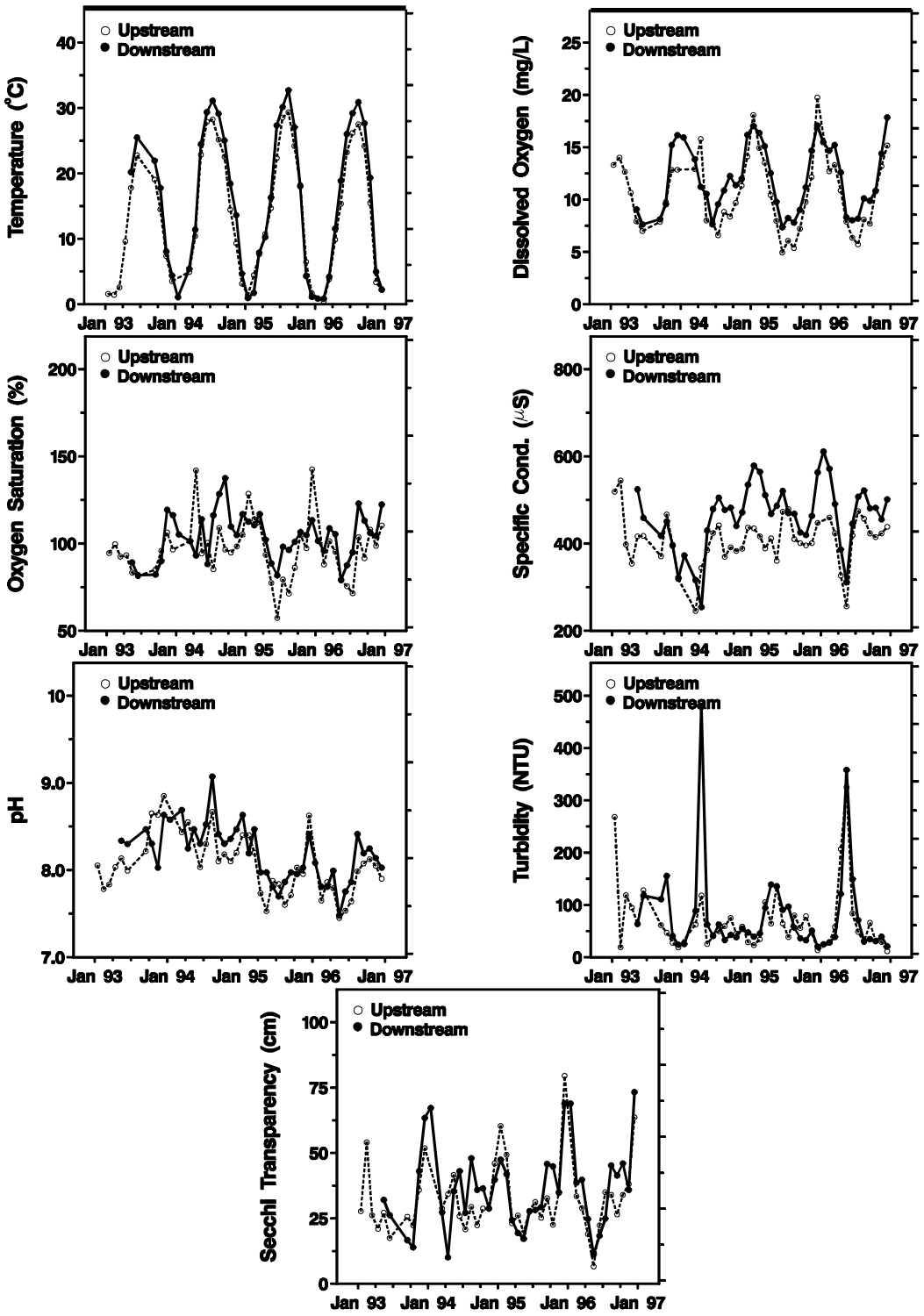

Figure E-1a. Monthly means of temperature (°C), dissolved oxygen (mg/L), oxygen saturation (%), pH, specific conductivity (µS), turbidity (NTU), and Secchi transparency (cm) at sites in upper and lower Pool 26 from 1993 through 1996.

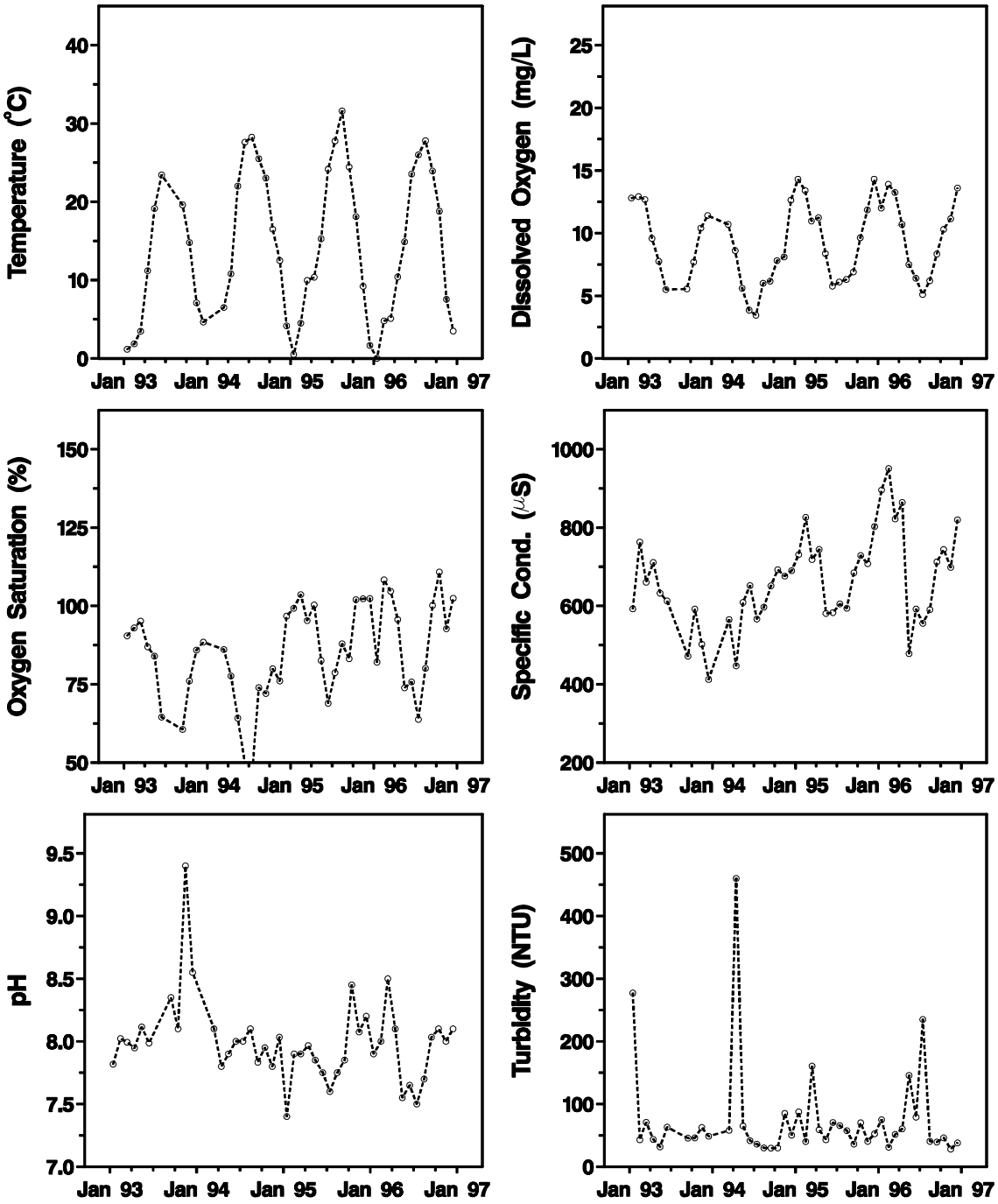

Figure E-1b. Monthly means of temperature (°C), dissolved oxygen (mg/L), oxygen saturation (%), pH, specific conductivity (µS), and turbidity (NTU) in the Illinois River from 1993 through 1996.

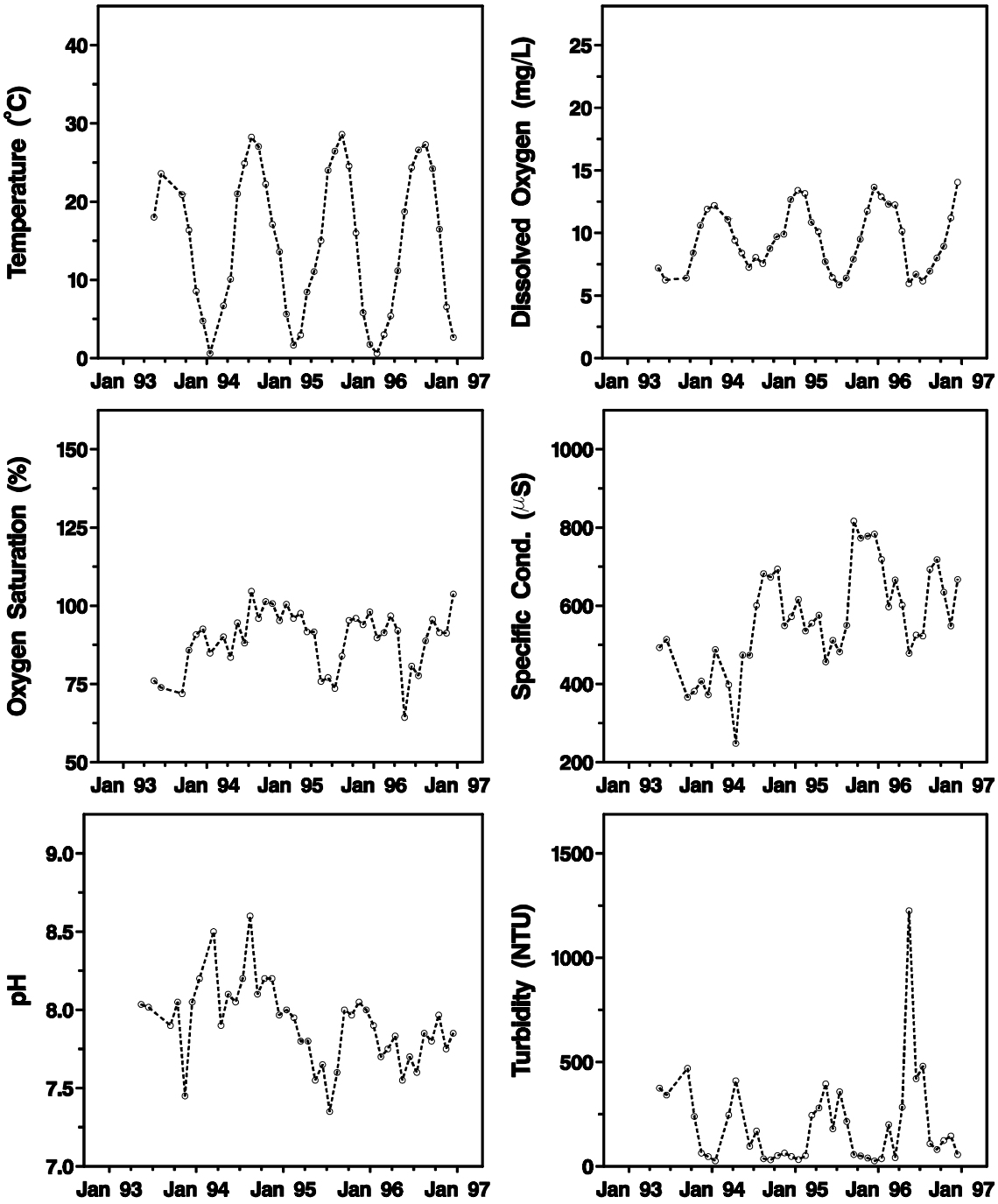

Figure E-1c. Monthly means of temperature (°C), dissolved oxygen (mg/L), oxygen saturation (%), pH, specific conductivity (µS), and turbidity (NTU) in the Missouri River from 1993 through 1996.

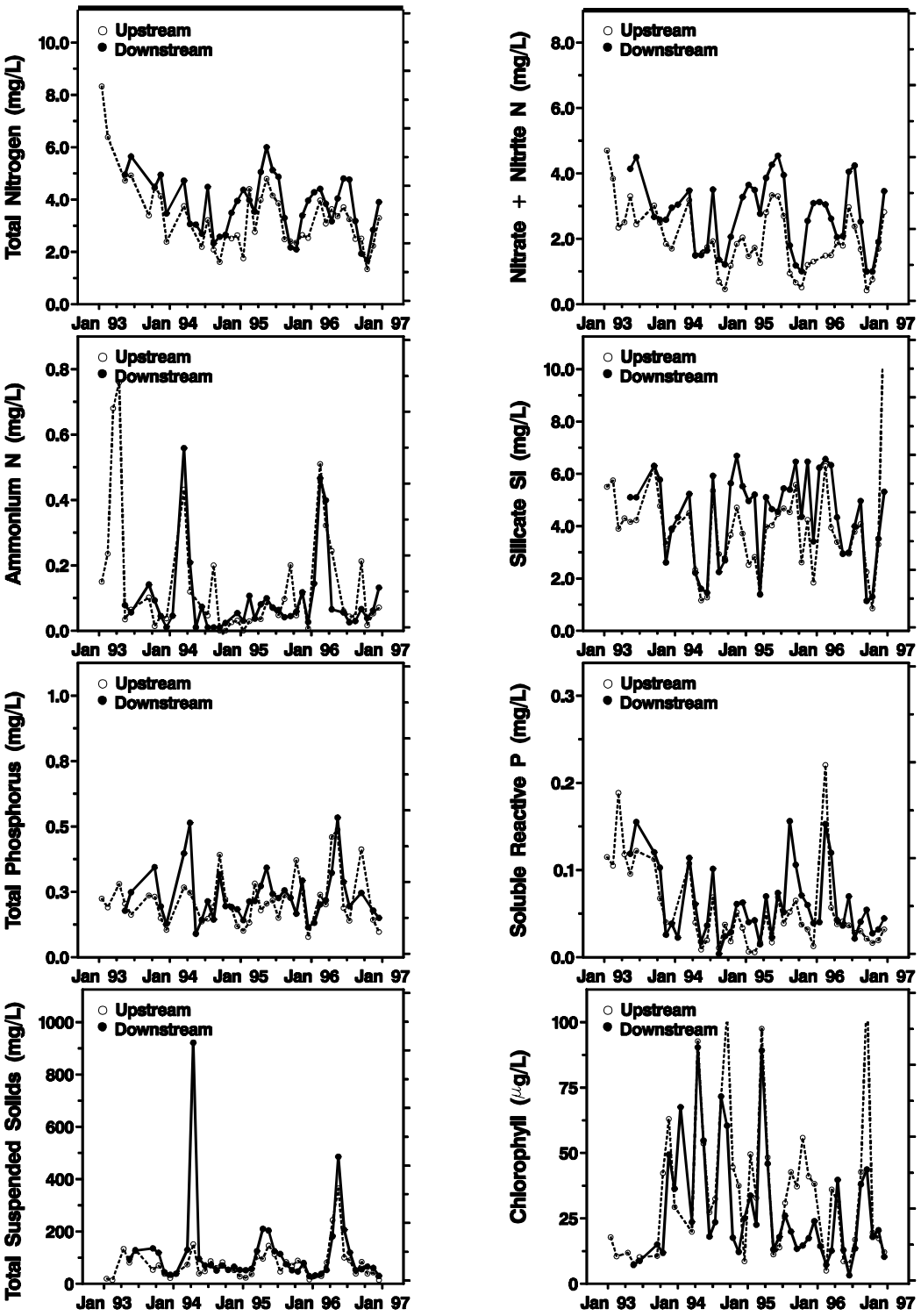

Figure E-2a. Monthly means of total nitrogen (mg/L), nitrate–nitrite nitrogen (mg/L), ammonium nitrogen (mg/L), silicate silicon (mg/L), total phosphorus (mg/L), soluble reactive phosphorus (mg/L), total suspended solids (mg/L), and chlorophyll *a* (µg/L) at sites in upper and lower Pool 26 from 1993 through 1996.

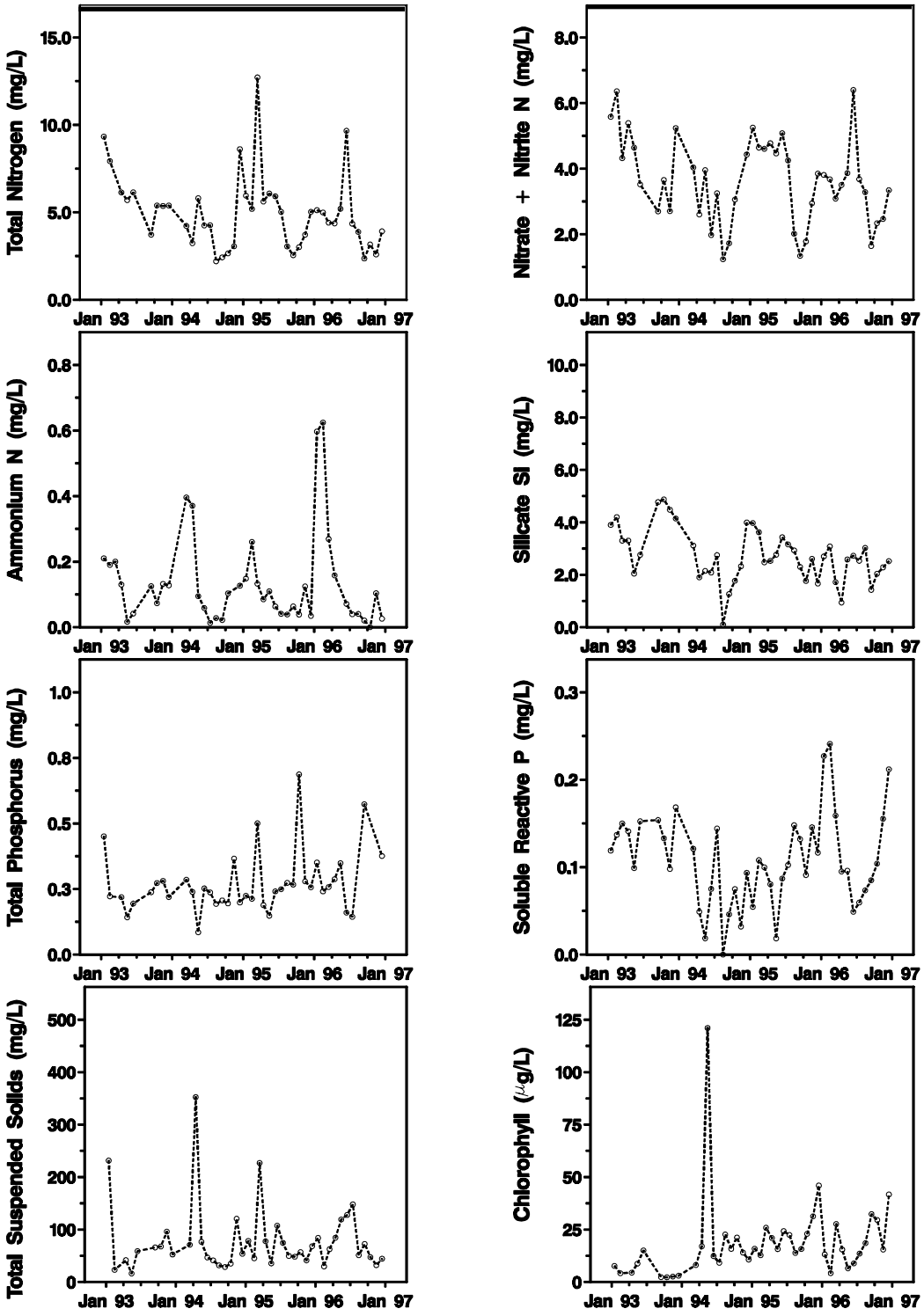

Figure E-2b. Monthly means of total nitrogen (mg/L), nitrate–nitrite nitrogen (mg/L), ammonium nitrogen (mg/L), silicate silicon (mg/L), total phosphorus (mg/L), soluble reactive phosphorus (mg/L), total suspended solids (mg/L), and chlorophyll *a* (µg/L) in the Illinois River from 1993 through 1996.

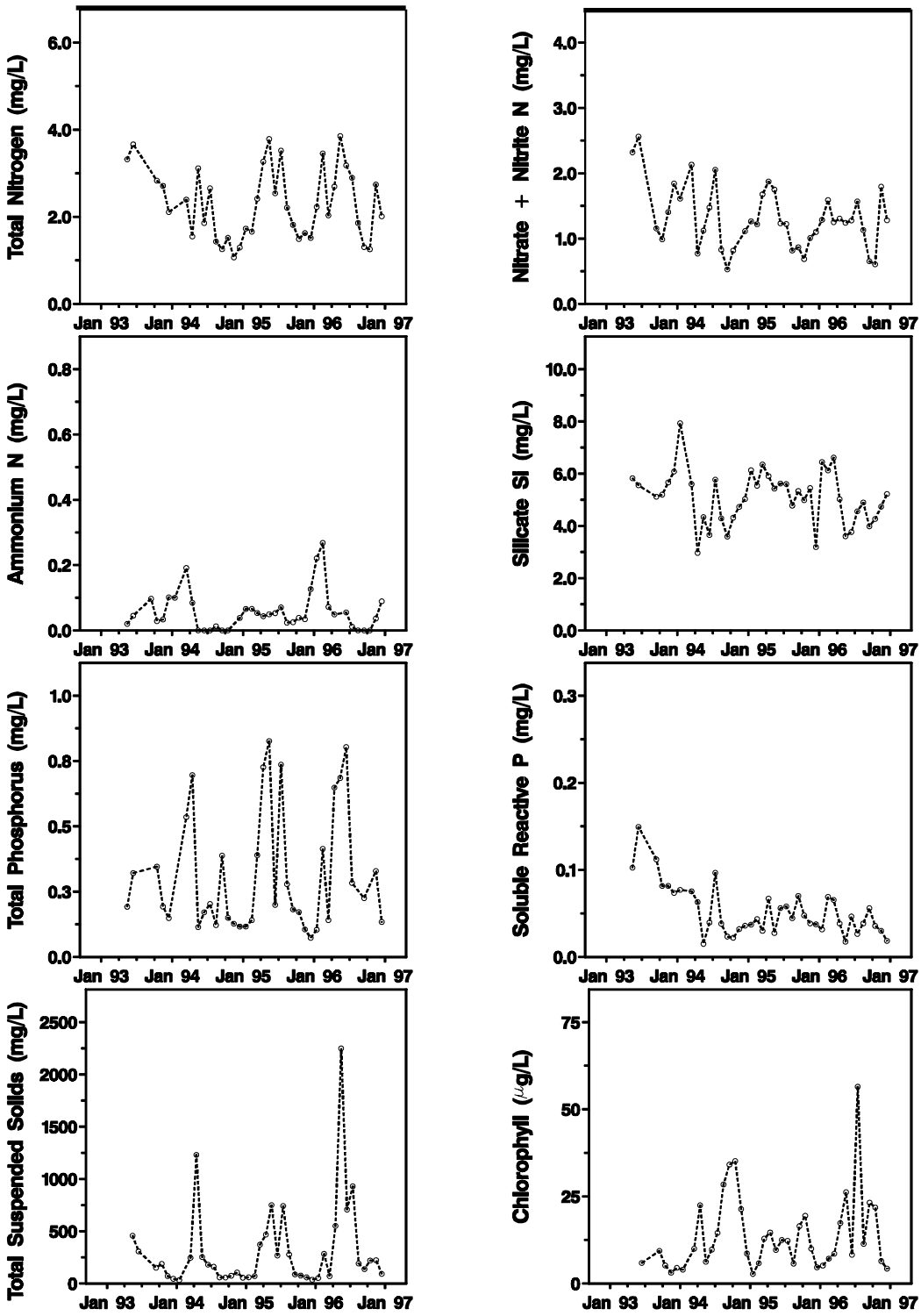

Figure E-2c. Monthly means of total nitrogen (mg/L), nitrate–nitrite nitrogen (mg/L), ammonium nitrogen (mg/L), silicate silicon (mg/L), total phosphorus (mg/L), soluble reactive phosphorus (mg/L), total suspended solids (mg/L), and chlorophyll *a* (µg/L) in the Missouri River from 1993 through 1996.

Appendix F. Stratified Random Sampling Data: 1993–1996

In Appendix F, we summarize data from stratified random sampling (SRS) in both tabular and graphic forms. The tables contain summary statistics for each SRS episode and stratum divided into two parameter groups: (1) physical and biological measurements (Table F-1), and (2) chemical data (major plant nutrients; Table F-2). Within each parameter group, the data are divided by sampling depth into three groups (surface, middepth, and bottom). Chemical measurements are typically collected only at the surface and near the bottom. The majority of all measurement are in the near-surface category and most episodes do not have chemical data from other depths. Refer to Appendix A for maps and descriptions of the individual sampling strata and episodes.

The figures (F-1–F-13) are box-whisker diagrams that connect the medians for each sampling episode from spring 1993 through fall 1996. The 10th and 90th percentiles for each episode are indicated by the lower and upper limits of the box. Vertical lines extend above and below each box to the minimum and maximum observed value or to the limits of the plotting axis.

Data that have been flagged as questionable in the Long Term Resource Monitoring Program database because of recorder error, instrument malfunction, sample damage, contamination, improper handling, analytical error, or other difficulties are excluded from this summary. Values that are below detection are indicated by the detection limit preceded by a negative sign. Below-detection values are included in the determination of minima, maxima, and medians, but in the calculation of means and standard deviations, values below detection have been replaced by a value equal to half the detection limit. The Secchi transparency data in this report do not include observations where Secchi transparency exceeded the water column depth. High transparency conditions are thus underrepresented.

Table F-1. Summaries of physical–biological measurements during each stratified random sampling episode from 1993 through 1996. Data are grouped into three sampling-depth categories: near–surface (less than or equal to 0.2 m below the surface), middepth, and near–bottom (less than or equal to 0.2 m above the substrate).

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-surface measurements: fall																			
1. Main channel	Mean	0.2	6.1	0.57	—	—	—	—	14.3	9.53	93	493	8.5	26.7	67	62.5	11.5	—	62.3
	Median	0.2	4.9	0.58	—	—	—	—	14	9.4	92	480	8.6	27	53	60.8	12.1	—	69
	Minimum	0.2	1.4	0.53	—	—	—	—	13	6.5	68	433	7.5	20	30	25.3	6.4	—	8.64
	Maximum	0.2	11.9	0.6	—	—	—	—	17.5	12.3	117	560	9	40	290	109	15.5	—	101
	Std. dev.	0	3.47	0.04	—	—	—	—	1.05	1.65	14.9	43.3	0.39	4.66	55	26.8	2.85	—	31.2
	N obs.	20	20	4	0	0	0	0	20	20	20	20	16	20	20	11	11	0	11
2. Side channel	Mean	0.2	3.37	0.48	—	—	—	—	13.5	10.3	98	480	8.5	29	52	66.5	12.5	71.2	74.2
	Median	0.2	2.7	0.47	—	—	—	—	13.6	10.6	103	466	8.6	29	41	63.9	13.6	54.1	75.9
	Minimum	0.2	0.6	0	—	—	—	—	7.4	5	50	417	7.4	17	25	20.3	2.3	26.9	3.95
	Maximum	0.2	9	0.95	—	—	—	—	16	13.5	128	563	9	44	200	98.2	15.9	132	138
	Std. dev.	0	2.27	0.21	—	—	—	—	1.3	1.95	17.8	41.4	0.44	6.53	30.2	16.4	3.4	54.8	43.9
	N obs.	41	41	41	0	0	0	0	41	41	41	41	25	41	41	21	21	3	21
3. Backwater	Mean	0.2	1.27	0.03	—	—	—	—	15	8.63	86	493	8	27.2	48	49.6	11.7	70.8	42.2
	Median	0.2	1.25	0	—	—	—	—	15.2	8.9	88	479	8	26.5	40	45.1	11.6	70.8	33.7
	Minimum	0.2	0.4	0	—	—	—	—	10.1	3.6	36	391	7.5	9	21	16.4	5.1	17.8	8.82
	Maximum	0.2	2.4	0.48	—	—	—	—	21	17	176	661	8.9	50	175	94.4	18.1	124	131
	Std. dev.	0	0.59	0.11	—	—	—	—	2.35	3.32	34.7	73.8	0.42	8.93	33.7	24.2	3.18	75	37.1
	N obs.	20	20	20	0	0	0	0	20	20	20	20	18	20	20	10	10	2	10
4. Lake	Mean	0.2	0.76	0	—	—	—	—	12.5	12.4	117	549	8.5	32.7	36	47.7	11.8	60.3	59.7
	Median	0.2	0.8	0	—	—	—	—	13.4	12.2	113	538	8.6	32	33	43.4	10	60.3	53.2
	Minimum	0.2	0.5	0	—	—	—	—	9.1	8.8	86	481	7.9	15	15	17.4	7.6	38.2	25.5
	Maximum	0.2	1.1	0	—	—	—	—	16	17.4	170	697	9.1	50	90	103	22.5	82.3	102
	Std. dev.	0	0.21	0	—	—	—	—	2.36	2.42	24.4	49	0.39	9.97	19.5	26.1	4.7	31.2	28.5
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	8	8	2	8
5. Impounded	Mean	0.2	1.73	0.02	—	—	—	—	15.4	9.07	91	436	8.2	30.1	36	43.2	10.3	—	32.8
	Median	0.2	1.2	0	—	—	—	—	15.5	8.5	86	435	8.3	30	37	41.8	10.4	—	33.1
	Minimum	0.2	0.5	0	—	—	—	—	14.8	8.2	82	418	8	24	21	33.4	8.7	—	21.9
	Maximum	0.2	4.1	0.15	—	—	—	—	15.9	10.3	104	461	8.4	37	45	53.5	12	—	43.8
	Std. dev.	0	1.12	0.06	—	—	—	—	0.36	0.82	8.47	12.4	0.12	3.91	6.76	7.8	1.22	—	7.98
	N obs.	15	15	7	0	0	0	0	15	15	15	15	15	15	15	8	8	0	8

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1993 Near-bottom measurements: fall																			
1. Main channel	Mean	1.6	1.8	—	—	—	—	—	13.8	11.8	114	—	—	—	—	—	—	—	—
	Median	1.6	1.8	—	—	—	—	—	13.8	11.8	114	—	—	—	—	—	—	—	—
	Minimum	1.6	1.8	—	—	—	—	—	13.8	11.8	114	—	—	—	—	—	—	—	—
	Maximum	1.6	1.8	—	—	—	—	—	13.8	11.8	114	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
2. Side channel	Mean	2.48	2.68	—	—	—	—	—	13.7	10.1	97	—	—	—	—	—	—	—	—
	Median	1.9	2.1	—	—	—	—	—	13.7	10.6	101	—	—	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	12.2	4.8	48	—	—	—	—	—	—	—	—
	Maximum	7.4	7.6	—	—	—	—	—	16	12.3	116	—	—	—	—	—	—	—	—
	Std. dev.	1.58	1.58	—	—	—	—	—	0.78	1.96	18	—	—	—	—	—	—	—	—
	N obs.	28	28	0	—	—	—	—	28	28	28	0	0	—	0	0	0	0	0
3. Backwater	Mean	1.37	1.57	—	—	—	—	—	14.3	7.02	69	477	—	—	—	—	—	—	—
	Median	1.45	1.65	—	—	—	—	—	14.5	7.45	74	477	—	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	10.1	2.6	26	477	—	—	—	—	—	—	—
	Maximum	2.2	2.4	—	—	—	—	—	19.5	12	122	477	—	—	—	—	—	—	—
	Std. dev.	0.41	0.41	—	—	—	—	—	2.47	3.18	31.8	—	—	—	—	—	—	—	—
	N obs.	14	14	0	—	—	—	—	14	14	14	1	0	—	0	0	0	0	0
4. Lake	Mean	0.87	1.07	—	—	—	—	—	12.5	13.5	127	—	—	—	—	—	—	—	—
	Median	0.9	1.1	—	—	—	—	—	13.8	13.6	122	—	—	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	9.9	12.6	120	—	—	—	—	—	—	—	—
	Maximum	0.9	1.1	—	—	—	—	—	13.9	14.4	139	—	—	—	—	—	—	—	—
	Std. dev.	0.06	0.06	—	—	—	—	—	2.28	0.9	10.5	—	—	—	—	—	—	—	—
	N obs.	3	3	0	—	—	—	—	3	3	3	0	0	—	0	0	0	0	0
5. Impounded	Mean	1.9	2.1	—	—	—	—	—	15.2	9.13	91	—	—	—	—	—	—	—	—
	Median	1.3	1.5	—	—	—	—	—	15.2	9	89	—	—	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	14.5	8.2	82	—	—	—	—	—	—	—	—
	Maximum	3.9	4.1	—	—	—	—	—	15.8	10.2	103	—	—	—	—	—	—	—	—
	Std. dev.	1.09	1.09	—	—	—	—	—	0.39	0.73	7.29	—	—	—	—	—	—	—	—
	N obs.	11	11	0	—	—	—	—	11	11	11	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements: winter																			
1. Main channel	Mean	0.2	5.83	0.35	31.6	4	0	0	0.36	14.9	103	725	7.9	107	12	11.5	3.1	9.09	6.17
	Median	0.2	6.1	0.35	40	2	0	0	0.25	14.5	100	671	7.9	125	6	5.1	2.6	7.86	6.25
	Minimum	0.2	1.8	0.35	1	1	0	0	0	13.6	93	432	7.5	30	4	3.5	1	7.07	4.99
	Maximum	0.2	9.8	0.35	85	18	0	0	1	16.6	114	1104	8.7	170	41	40.2	6.2	12.4	7.6
	Std. dev.	0	2.26	—	27.4	4.4	0	0	0.32	0.93	6.65	173	0.33	45	11.2	11.9	1.47	2.85	0.78
	N obs.	18	18	1	15	15	15	15	18	18	18	18	13	17	17	17	17	3	16
2. Side channel	Mean	0.2	4.13	0.31	42.6	8	5	0	0.29	13.9	96	714	8	118	10	9.4	3.2	8.64	6.76
	Median	0.2	3.4	0.28	20	7	0	0	0.2	14	96	705	8.1	128	7	5.1	2.6	8.64	6.71
	Minimum	0.2	0.7	0.04	1	1	0	0	0	12.3	85	525	7.2	35	3	3.3	-0.1	8.64	3.68
	Maximum	0.2	10.1	0.6	100	18	50	1	1.2	16.4	113	999	8.6	200	35	52	12.4	8.64	9.45
	Std. dev.	0	2.36	0.16	41.8	5.8	13	.45	0.33	1.21	8.81	133	0.33	49.6	8.44	10.3	2.26	—	1.19
	N obs.	29	29	29	19	19	19	19	29	29	29	29	24	20	29	29	29	1	29
3. Backwater	Mean	0.2	0.89	0	95	13	0	0	4.02	14.4	108	564	8.2	45.3	26	33.8	11	—	36.3
	Median	0.2	0.8	0	100	12	0	0	4.2	13.7	99	558	8.3	39	26	33.9	10.3	—	22.7
	Minimum	0.2	0.5	0	60	7	0	0	0.2	7.2	55	448	7.6	20	7	6.4	3.2	—	5.85
	Maximum	0.2	2	0	100	20	0	0	8	20	163	640	8.6	110	46	60.8	24	—	123
	Std. dev.	0	0.44	0	14.1	4.34	0	0	2.49	5.29	39.5	61.1	0.51	28.2	14.5	16.3	6.3	—	37.1
	N obs.	11	11	9	8	8	8	8	11	10	10	11	3	8	11	11	11	0	11
4. Lake	Mean	0.2	0.38	0.05	67.3	11	57	1	2.17	19.9	145	496	—	25	29	38.2	12.8	—	39.7
	Median	0.2	0.4	0.05	100	15	85	2	3	20	147	473	—	25	24	37.2	12.4	—	36.8
	Minimum	0.2	0.3	0.04	2	2	0	0	0.5	19.8	139	470	—	25	15	21.6	10.7	—	29
	Maximum	0.2	0.5	0.06	100	15	85	2	3	20	149	544	—	25	49	55.7	15.3	—	53.2
	Std. dev.	0	0.08	0.01	56.6	7.51	49.1	1.2	1.44	0.12	5.36	41.9	—	—	17.6	17.1	2.33	—	12.4
	N obs.	5	5	3	3	3	3	3	3	3	3	3	0	1	3	3	3	0	3
5. Impounded	Mean	0.2	3	—	98.8	20	88	1	0.68	13.4	93	556	—	104	9	9.6	6.1	12	13.5
	Median	0.2	3	—	100	21	100	1	0.65	13.5	93	619	—	120	7	7.2	4.4	12	11.4
	Minimum	0.2	1	—	90	12	1	1	0.2	12	84	323	—	50	5	5.6	2.4	12	6.5
	Maximum	0.2	4.7	—	100	28	100	1	1	14.7	101	679	—	140	15	17.8	19.7	12	27
	Std. dev.	0	1.32	—	3.54	5.99	35	0	0.28	0.93	6.09	134	—	35.4	3.66	4.68	5.64	—	6.8
	N obs.	8	8	0	8	8	8	7	8	8	8	8	0	7	8	8	8	1	8

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-bottom measurements: winter																			
2. Side channel	Mean	3.57	3.77	—	—	—	—	—	0.56	14.7	102	—	—	—	—	—	—	—	—
	Median	2.8	3	—	—	—	—	—	0.4	14.8	102	—	—	—	—	—	—	—	—
	Minimum	1.8	2	—	—	—	—	—	0.1	14	96	—	—	—	—	—	—	—	—
	Maximum	6.2	6.4	—	—	—	—	—	1.3	15.5	110	—	—	—	—	—	—	—	—
	Std. dev.	1.82	1.82	—	—	—	—	—	0.5	0.56	5.26	—	—	—	—	—	—	—	—
	N obs.	7	7	0	—	—	—	—	7	7	7	0	0	—	0	0	0	0	0
3. Backwater	Mean	1	1.2	—	—	—	—	—	4.25	10.2	78	—	—	—	—	—	—	—	—
	Median	1	1.2	—	—	—	—	—	4.25	10.2	78	—	—	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	3.5	9	70	—	—	—	—	—	—	—	—
	Maximum	1.1	1.3	—	—	—	—	—	5	11.4	86	—	—	—	—	—	—	—	—
	Std. dev.	0.14	0.14	—	—	—	—	—	1.06	1.7	10.9	—	—	—	—	—	—	—	—
	N obs.	2	2	0	—	—	—	—	2	2	2	0	0	—	0	0	0	0	0
5. Impounded	Mean	3.09	3.29	—	—	—	—	—	0.76	13	91	—	—	—	—	—	—	—	—
	Median	3.1	3.3	—	—	—	—	—	0.7	12.8	90	—	—	—	—	—	—	—	—
	Minimum	1.7	1.9	—	—	—	—	—	0.5	12.2	86	—	—	—	—	—	—	—	—
	Maximum	4.5	4.7	—	—	—	—	—	1	13.8	96	—	—	—	—	—	—	—	—
	Std. dev.	1.13	1.13	—	—	—	—	—	0.24	0.59	3.84	—	—	—	—	—	—	—	—
	N obs.	7	7	0	—	—	—	—	7	7	7	0	0	—	0	0	0	0	0
1994 Near-surface measurements: spring																			
1. Main channel	Mean	0.2	6.08	1.3	—	—	—	—	16.1	8.54	87	389	8.7	19.1	83	142	21.4	110	88.9
	Median	0.2	6.2	1.3	—	—	—	—	16.2	8.3	83	374	8.6	21	73	127	19.6	110	86
	Minimum	0.2	0.8	1.02	—	—	—	—	13.7	7	71	332	8.2	8	47	51.3	9.2	110	13.9
	Maximum	0.2	11.4	1.58	—	—	—	—	18.2	10.7	113	517	9.2	32	150	288	42.8	110	177
	Std. dev.	0	2.71	0.4	—	—	—	—	1.38	0.98	11.4	49.2	0.34	7.31	30.3	73.6	7.99	—	49.8
	N obs.	20	20	2	0	0	0	0	20	20	20	20	11	20	20	20	20	1	20
2. Side channel	Mean	0.2	3.85	0.67	—	—	—	—	15.3	8.36	84	386	8.7	17.7	91	126	18.6	104	69.8
	Median	0.2	3.1	0.68	—	—	—	—	15	8.3	82	374	8.6	18	77	113	17.7	92.7	57.8
	Minimum	0.2	0.97	0	—	—	—	—	6.5	7.2	71	227	8.2	6	48	43.9	8.5	61.8	8.6
	Maximum	0.2	8.7	1.11	—	—	—	—	18.5	10.8	114	539	9.2	45	280	308	45.9	159	197
	Std. dev.	0	2.23	0.27	—	—	—	—	2.01	0.96	11.3	67.1	0.35	7.62	46.7	69.5	7.19	49.5	48.4
	N obs.	42	42	40	0	0	0	0	42	42	42	42	15	42	42	42	42	3	42

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements: spring																			
3. Backwater	Mean	0.2	1.13	0.01	—	—	—	—	16.9	9.24	96	333	8.6	20	83	68.9	14.9	38.4	48.8
	Median	0.2	1.02	0	—	—	—	—	16.6	9	94	329	8.3	19	66	57.9	13.1	38.4	39.7
	Minimum	0.2	0.4	0	—	—	—	—	12.6	5.6	57	238	8	5	22	27.3	9.1	38.4	20.3
	Maximum	0.2	2.8	0.16	—	—	—	—	23.1	13.4	151	488	9.3	41	360	167	36.2	38.4	152
	Std. dev.	0	0.49	0.03	—	—	—	—	3.19	2.06	24.8	56.4	0.56	9.02	66.9	35.4	6.26	—	29.3
	N obs.	28	28	28	0	0	0	0	28	28	28	28	5	28	28	28	28	1	28
4. Lake	Mean	0.2	1.44	0	—	—	—	—	19.7	11.2	122	488	8.5	23.7	48	47.5	10.7	47	56
	Median	0.2	1.5	0	—	—	—	—	21.1	10.3	114	468	8.6	22	51	51	10.7	41.3	46.7
	Minimum	0.2	0.87	0	—	—	—	—	15.7	7.4	83	452	8.1	14	20	18.3	5.5	28.4	31.7
	Maximum	0.2	2	0.02	—	—	—	—	24.2	19.6	207	547	8.7	33	91	94.8	17.9	77.1	131
	Std. dev.	0	0.37	0.01	—	—	—	—	3.09	3.03	31	33.4	0.2	6.88	21.9	22.6	3.86	21	26.1
	N obs.	15	15	15	0	0	0	0	15	15	15	15	8	15	15	15	15	4	15
5. Impounded	Mean	0.2	1.92	0	—	—	—	—	15	8.42	83	324	8.5	17.8	84	79.8	12.9	28.4	36.6
	Median	0.2	1.6	0	—	—	—	—	14.5	8.1	80	324	8.1	17	64	72.1	12.1	34.3	37.6
	Minimum	0.2	0.9	0	—	—	—	—	12.2	7.6	76	308	8.1	12	44	38.4	7.3	9.94	16.1
	Maximum	0.2	5.1	0	—	—	—	—	18.5	11.1	103	336	9.2	28	200	149	20.8	40.8	57.5
	Std. dev.	0	1.01	0	—	—	—	—	1.79	0.86	7.4	8.59	0.64	4.35	47.2	33.8	4.21	16.3	11.7
	N obs.	15	15	14	0	0	0	0	15	15	15	15	3	15	15	15	15	3	15
1994 Middepth measurements: spring																			
3. Backwater	Mean	0.8	1.09	—	—	—	—	—	13.4	5.9	57	—	—	—	—	—	—	—	—
	Median	0.8	1.09	—	—	—	—	—	13.4	5.9	57	—	—	—	—	—	—	—	—
	Minimum	0.8	1.09	—	—	—	—	—	13.4	5.9	57	—	—	—	—	—	—	—	—
	Maximum	0.8	1.09	—	—	—	—	—	13.4	5.9	57	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
4. Lake	Mean	0.8	1.09	—	—	—	—	—	23	10.3	121	—	—	—	—	—	—	—	—
	Median	0.8	1.09	—	—	—	—	—	23	10.3	121	—	—	—	—	—	—	—	—
	Minimum	0.8	1.09	—	—	—	—	—	23	10.3	121	—	—	—	—	—	—	—	—
	Maximum	0.8	1.09	—	—	—	—	—	23	10.3	121	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-bottom measurements: spring																			
2. Side channel	Mean	2.5	2.71	—	—	—	—	—	15.6	8.52	86	—	—	—	—	—	—	—	—
	Median	2.4	2.6	—	—	—	—	—	15	8.4	83	—	—	—	—	—	—	—	—
	Minimum	0.8	1.03	—	—	—	—	—	12.9	7.1	70	—	—	—	—	—	—	—	—
	Maximum	6.2	6.4	—	—	—	—	—	18.5	10.8	114	—	—	—	—	—	—	—	—
	Std. dev.	1.14	1.13	—	—	—	—	—	1.52	1.05	12.3	—	—	—	—	—	—	—	—
	N obs.	27	27	0	—	—	—	—	27	27	27	0	0	—	0	0	0	0	0
3. Backwater	Mean	1.21	1.43	—	—	—	—	—	16.7	8.62	89	—	—	—	—	—	—	—	—
	Median	1	1.24	—	—	—	—	—	16.5	8.85	87	—	—	—	—	—	—	—	—
	Minimum	0.8	1.01	—	—	—	—	—	12.9	5.8	61	—	—	—	—	—	—	—	—
	Maximum	2.6	2.8	—	—	—	—	—	23	11.7	128	—	—	—	—	—	—	—	—
	Std. dev.	0.53	0.51	—	—	—	—	—	3.18	2.02	21.8	—	—	—	—	—	—	—	—
	N obs.	14	14	0	—	—	—	—	14	14	14	0	0	—	0	0	0	0	0
4. Lake	Mean	1.35	1.56	—	—	—	—	—	17.7	9.2	97	522	—	—	—	50.1	9.3	—	34.4
	Median	1.5	1.7	—	—	—	—	—	15.2	8.6	92	522	—	—	—	50.1	9.3	—	34.4
	Minimum	0.8	1.05	—	—	—	—	—	14.2	7.7	80	489	—	—	—	42.8	8.9	—	8.58
	Maximum	1.8	2	—	—	—	—	—	22.6	14.7	147	554	—	—	—	57.3	9.6	—	60.1
	Std. dev.	0.32	0.31	—	—	—	—	—	3.56	1.84	19	46	—	—	—	10.3	0.49	—	36.5
	N obs.	12	12	0	—	—	—	—	12	12	12	2	0	—	0	2	2	0	2
5. Impounded	Mean	1.9	2.11	—	—	—	—	—	14.3	8.34	81	—	—	—	—	—	—	—	—
	Median	1.65	1.85	—	—	—	—	—	14.2	8.2	80	—	—	—	—	—	—	—	—
	Minimum	0.9	1.18	—	—	—	—	—	12.1	7.6	74	—	—	—	—	—	—	—	—
	Maximum	4.9	5.1	—	—	—	—	—	17.8	11.2	104	—	—	—	—	—	—	—	—
	Std. dev.	1.04	1.04	—	—	—	—	—	1.3	0.96	7.97	—	—	—	—	—	—	—	—
	N obs.	12	12	0	—	—	—	—	12	12	12	0	0	—	0	0	0	0	0
1994 Near-surface measurements: summer																			
1. Main channel	Mean	0.2	5.36	0.25	—	—	—	—	26.6	7.41	93	417	8.5	40.6	30	36.8	7	—	29.4
	Median	0.2	5.15	0.25	—	—	—	—	26.6	7.6	95	419	8.5	40	27	32.2	7.2	—	29.3
	Minimum	0.2	1.5	0	—	—	—	—	25.8	6.1	76	309	8.2	23	21	14.9	3.9	—	18.5
	Maximum	0.2	8	0.5	—	—	—	—	28	9.1	116	548	8.7	58	50	69.1	10.5	—	55.7
	Std. dev.	0	1.54	0.35	—	—	—	—	0.65	0.88	11.4	53	0.14	9.87	9.45	16.9	1.79	—	8.7
	N obs.	20	20	2	0	0	0	0	20	20	20	20	20	20	18	18	18	0	19

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements: summer																			
2. Side channel	Mean	0.2	2.99	0.44	—	—	—	—	26.7	7.61	96	409	8.5	34.6	35	44.1	8.2	23.7	34.9
	Median	0.2	2.4	0.45	—	—	—	—	26.6	7.6	95	423	8.6	33	36	42.8	6.8	23.5	29.3
	Minimum	0.2	0.61	0	—	—	—	—	25.1	5.4	70	293	7.6	19	13	19.8	4.2	18.7	17
	Maximum	0.2	6.7	0.88	—	—	—	—	28.9	14.8	190	498	9.3	54	60	85.4	21.1	29.2	144
	Std. dev.	0	1.74	0.2	—	—	—	—	0.71	1.37	17.5	49.8	0.23	7.63	10.8	17.2	3.69	3.95	21.2
	N obs.	41	41	39	0	0	0	0	40	40	40	41	41	41	41	39	39	6	41
3. Backwater	Mean	0.2	0.88	0.01	—	—	—	—	26.6	9.88	125	379	8.9	21.3	76	91.4	23.5	88.5	131
	Median	0.2	0.75	0	—	—	—	—	26.7	9.6	121	395	8.9	21	58	71.7	23.6	103	134
	Minimum	0.2	0.34	0	—	—	—	—	23	5	63	279	7.9	10	19	26.8	5.5	20.1	24.9
	Maximum	0.2	3.4	0.38	—	—	—	—	31.2	15	198	498	9.4	44	200	236	53.5	142	255
	Std. dev.	0	0.62	0.07	—	—	—	—	2.07	2.98	39.1	64	0.38	8.05	47.6	58.8	10.2	62.4	54.5
	N obs.	31	31	30	0	0	0	0	31	31	31	30	31	31	30	30	30	3	30
5. Impounded	Mean	0.2	2.07	0	—	—	—	—	26.6	8.31	105	427	8.6	29.6	42	41.7	8.3	37.3	45.3
	Median	0.2	1.65	0	—	—	—	—	26.9	8.75	111	422	8.6	29	40	38.2	8.6	37.3	32.4
	Minimum	0.2	0.79	0	—	—	—	—	25.4	4.9	62	361	8.4	20	30	22.9	2.3	16.5	14.9
	Maximum	0.2	3.9	0	—	—	—	—	27.5	12.8	162	469	9.1	47	54	57.6	12.8	58	123
	Std. dev.	0	1.01	0	—	—	—	—	0.67	3.03	39.1	34	0.23	7.31	9.33	10.6	2.92	29.3	31.4
	N obs.	14	14	14	0	0	0	0	14	14	14	14	14	14	9	14	14	2	14
1994 Middepth measurements: summer																			
3. Backwater	Mean	0.8	1.09	—	—	—	—	—	29	14	185	—	—	—	—	—	—	—	—
	Median	0.8	1.09	—	—	—	—	—	29	14	185	—	—	—	—	—	—	—	—
	Minimum	0.8	1.09	—	—	—	—	—	29	14	185	—	—	—	—	—	—	—	—
	Maximum	0.8	1.09	—	—	—	—	—	29	14	185	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
1994 Near-bottom measurements: summer																			
1. Main channel	Mean	3.4	3.6	—	—	—	—	—	27	7	89	—	—	—	—	—	—	—	—
	Median	3.4	3.6	—	—	—	—	—	27	7	89	—	—	—	—	—	—	—	—
	Minimum	1.3	1.5	—	—	—	—	—	27	6.3	80	—	—	—	—	—	—	—	—
	Maximum	5.5	5.7	—	—	—	—	—	27	7.7	98	—	—	—	—	—	—	—	—
	Std. dev.	2.97	2.97	—	—	—	—	—	0	0.99	12.6	—	—	—	—	—	—	—	—
	N obs.	2	2	0	—	—	—	—	2	2	2	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-bottom measurements: summer																			
2. Side channel	Mean	2.5	2.71	—	—	—	—	—	26.6	7.35	93	—	—	—	—	—	—	—	—
	Median	1.9	2.1	—	—	—	—	—	26.7	7.4	91	—	—	—	—	—	—	—	—
	Minimum	0.9	1.15	—	—	—	—	—	25	5.3	68	—	—	—	—	—	—	—	—
	Maximum	6.5	6.7	—	—	—	—	—	27.7	13	165	—	—	—	—	—	—	—	—
	Std. dev.	1.58	1.57	—	—	—	—	—	0.62	1.35	17	—	—	—	—	—	—	—	—
	N obs.	28	28	0	—	—	—	—	28	28	28	0	0	—	0	0	0	0	0
3. Backwater	Mean	1.5	1.7	—	—	—	—	—	27.1	7.59	96	—	—	—	—	—	—	—	—
	Median	1.3	1.5	—	—	—	—	—	26.8	8.4	107	—	—	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	24.1	4.2	53	—	—	—	—	—	—	—	—
	Maximum	3.2	3.4	—	—	—	—	—	31.2	9.8	124	—	—	—	—	—	—	—	—
	Std. dev.	0.81	0.81	—	—	—	—	—	2.18	2.14	27.2	—	—	—	—	—	—	—	—
	N obs.	7	7	0	—	—	—	—	7	7	7	0	0	—	0	0	0	0	0
5. Impounded	Mean	1.95	2.17	—	—	—	—	—	26.3	6.53	82	—	—	—	—	—	—	—	—
	Median	1.4	1.65	—	—	—	—	—	26.1	6.2	77	—	—	—	—	—	—	—	—
	Minimum	0.9	1.12	—	—	—	—	—	25.7	4.8	59	—	—	—	—	—	—	—	—
	Maximum	3.7	3.9	—	—	—	—	—	27.1	10.4	130	—	—	—	—	—	—	—	—
	Std. dev.	1	0.98	—	—	—	—	—	0.45	1.8	22.8	—	—	—	—	—	—	—	—
	N obs.	13	13	0	—	—	—	—	13	13	13	0	0	—	0	0	0	0	0
1994 Near-surface measurements: fall																			
1. Main channel	Mean	0.2	5.9	—	—	—	—	—	16.4	9.38	96	423	8.1	41.3	27	30.7	6	14.2	13
	Median	0.2	5.2	—	—	—	—	—	16.4	9.45	96	409	8.1	40	26	29.3	6.2	14.2	13.6
	Minimum	0.2	2.1	—	—	—	—	—	15.7	8.4	86	397	7.9	33	18	19.7	4.5	12.7	6.85
	Maximum	0.2	16	—	—	—	—	—	17.5	10.3	106	500	8.4	71	39	48.4	7.7	15.7	16.9
	Std. dev.	0	2.72	—	—	—	—	—	0.48	0.53	5.3	32.8	0.13	7.97	5.03	8.2	0.92	2.12	2.48
	N obs.	20	20	0	0	0	0	0	20	20	20	20	20	20	20	20	20	2	20
2. Side channel	Mean	0.2	3.46	0.4	—	—	—	—	16.5	9.2	94	425	8.1	39.2	25	30.8	5.8	12	11.3
	Median	0.2	3	0.35	—	—	—	—	16.4	9.3	95	410	8	39	24	29	5.6	10.7	11
	Minimum	0.2	0.5	0	—	—	—	—	15.8	8.3	85	398	7.5	23	19	14.4	3.4	10.2	6.9
	Maximum	0.2	9.8	0.78	—	—	—	—	18	10.1	102	517	8.9	53	36	52.8	8.8	15	15.8
	Std. dev.	0	2.08	0.2	—	—	—	—	0.56	0.45	4.45	33	0.19	6.48	3.89	8.74	1.18	2.17	2.31
	N obs.	42	42	38	0	0	0	0	42	42	42	42	42	42	42	42	42	5	42

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-surface measurements: fall																			
3. Backwater	Mean	0.2	0.75	0.01	—	—	—	—	18.3	9.51	102	426	8.3	22.3	52	67.8	15.4	89.4	68.7
	Median	0.2	0.62	0	—	—	—	—	18.3	9.4	100	419	8.3	22	45	64.8	14.9	105	63.7
	Minimum	0.2	0.33	0	—	—	—	—	14.6	4.4	47	370	7.6	11	27	28.3	5.6	31.2	8.42
	Maximum	0.2	1.8	0.3	—	—	—	—	25.5	17	188	521	9	44	110	142	31.9	117	216
	Std. dev.	0	0.42	0.06	—	—	—	—	2.07	2.57	29	41.3	0.39	7.52	20.3	29.9	6.17	39.3	43
	N obs.	29	29	29	0	0	0	0	29	29	29	29	27	29	28	29	29	4	29
4. Lake	Mean	0.2	0.59	0	—	—	—	—	17.2	8.07	84	613	8.3	16	78	77.4	20.8	19.8	71.5
	Median	0.2	0.62	0	—	—	—	—	18.1	8.7	90	610	8.3	16	73	75.8	19.8	19.8	65.3
	Minimum	0.2	0.34	0	—	—	—	—	15	4.4	47	575	7.9	6	34	37.1	8.2	19.8	18.5
	Maximum	0.2	0.96	0	—	—	—	—	19.4	9.9	105	674	8.7	25	140	135	34.6	19.8	118
	Std. dev.	0	0.18	0	—	—	—	—	1.67	1.74	18.6	29.8	0.29	6.11	29.4	26.2	7.8	—	30.8
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	1	15
5. Impounded	Mean	0.2	2.04	0.03	—	—	—	—	17.1	10.3	107	382	8.3	31.3	29	32.6	7.5	15.7	29.8
	Median	0.2	1.55	0	—	—	—	—	17	9.8	100	381	8.1	31	25	26.3	6.4	15.7	17.1
	Minimum	0.2	0.75	0	—	—	—	—	16.3	7.7	81	367	7.8	20	20	20.5	2.8	15.7	10.7
	Maximum	0.2	5.1	0.17	—	—	—	—	18.4	17.7	183	397	9.1	45	53	68.4	18.5	15.7	83.1
	Std. dev.	0	1.4	0.06	—	—	—	—	0.73	2.56	26.5	8.29	0.34	6.67	9.68	13.1	4.42	—	25.1
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	1	15
1994 Middepth measurements: fall																			
2. Side channel	Mean	2.1	3.3	—	—	—	—	—	17.1	9	93	—	—	—	—	—	—	—	—
	Median	2.1	3.3	—	—	—	—	—	17.1	9	93	—	—	—	—	—	—	—	—
	Minimum	2.1	3.3	—	—	—	—	—	17.1	9	93	—	—	—	—	—	—	—	—
	Maximum	2.1	3.3	—	—	—	—	—	17.1	9	93	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
5. Impounded	Mean	2.7	3.9	—	—	—	—	—	16.7	10.5	108	—	—	—	—	—	—	—	—
	Median	2.7	3.9	—	—	—	—	—	16.7	10.5	108	—	—	—	—	—	—	—	—
	Minimum	2.7	3.9	—	—	—	—	—	16.7	10.5	108	—	—	—	—	—	—	—	—
	Maximum	2.7	3.9	—	—	—	—	—	16.7	10.5	108	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1994 Near-bottom measurements: fall																			
1. Main channel	Mean	1.8	2.1	—	—	—	—	—	16.4	8.6	88	—	—	—	—	—	—	—	—
	Median	1.8	2.1	—	—	—	—	—	16.4	8.6	88	—	—	—	—	—	—	—	—
	Minimum	1.8	2.1	—	—	—	—	—	16.4	8.6	88	—	—	—	—	—	—	—	—
	Maximum	1.8	2.1	—	—	—	—	—	16.4	8.6	88	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
2. Side channel	Mean	1.85	2.06	—	—	—	—	—	16.4	9.11	93	410	8	—	—	—	—	—	—
	Median	1.6	1.8	—	—	—	—	—	16.3	9.3	94	410	8	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	15.8	7.9	82	410	8	—	—	—	—	—	—
	Maximum	4.3	4.5	—	—	—	—	—	17.4	9.7	100	410	8	—	—	—	—	—	—
	Std. dev.	0.94	0.94	—	—	—	—	—	0.52	0.5	4.83	—	—	—	—	—	—	—	—
	N obs.	15	15	0	—	—	—	—	15	15	15	1	1	—	0	0	0	0	0
3. Backwater	Mean	1.43	1.63	—	—	—	—	—	19.5	6.63	73	—	—	—	—	—	—	—	—
	Median	1.45	1.65	—	—	—	—	—	17.8	6.8	71	—	—	—	—	—	—	—	—
	Minimum	1.2	1.4	—	—	—	—	—	16.8	3.9	41	—	—	—	—	—	—	—	—
	Maximum	1.6	1.8	—	—	—	—	—	25.5	9	111	—	—	—	—	—	—	—	—
	Std. dev.	0.21	0.21	—	—	—	—	—	4.05	2.09	28.6	—	—	—	—	—	—	—	—
	N obs.	4	4	0	—	—	—	—	4	4	4	0	0	—	0	0	0	0	0
5. Impounded	Mean	2.11	2.32	—	—	—	—	—	16.8	8.6	89	—	—	—	—	—	—	—	—
	Median	1.65	1.85	—	—	—	—	—	16.8	9.5	97	—	—	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	16.2	1.4	15	—	—	—	—	—	—	—	—
	Maximum	4.9	5.1	—	—	—	—	—	18.2	10.9	112	—	—	—	—	—	—	—	—
	Std. dev.	1.41	1.41	—	—	—	—	—	0.65	2.73	28.1	—	—	—	—	—	—	—	—
	N obs.	10	10	0	—	—	—	—	10	10	10	0	0	—	0	0	0	0	0
1995 Near-surface measurements: winter																			
1. Main channel	Mean	0.2	5.88	—	40.6	2	0	0	0.52	14	97	525	8	51.8	33	40.4	6.2	—	7.37
	Median	0.2	5.7	—	35	1	0	0	0.4	14	97	507	8	47	27	29	4.7	—	6.3
	Minimum	0.2	1.5	—	5	1	0	0	0	12.6	88	304	7.8	19	15	10	1.9	—	2.52
	Maximum	0.2	12	—	80	4	0	0	1.3	16.6	117	695	8.2	86	88	98.2	12.8	—	14.4
	Std. dev.	0	3.03	—	30.7	1	0	0	0.44	0.89	6.39	98.2	0.12	22.3	20.2	28.8	3.3	—	3.78
	N obs.	20	20	0	9	9	9	9	20	20	20	20	9	20	20	20	20	0	20

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements: winter																			
2. Side channel	Mean	0.2	4.03	0.34	23.9	2	0	0	0.95	14.1	99	475	8.1	41.6	68	62.9	8.9	18.9	8.44
	Median	0.2	4	0.35	12.5	2	0	0	0.5	13.8	96	505	8	35	35	42.9	7.4	18.9	5.07
	Minimum	0.2	0.88	0	1	1	0	0	0	12.2	84	189	7.5	10	12	8.7	1.8	15.3	0
	Maximum	0.2	10	0.65	100	6	0	0	4.4	20	154	732	9.2	85	270	254	23.6	22.5	53.5
	Std. dev.	0	2.27	0.15	31.3	1.62	0	0	1.15	1.84	16.3	140	0.45	21.4	74.5	60.9	5.36	3.23	10.3
	N obs.	41	41	41	28	28	28	28	41	41	41	41	22	41	41	40	40	4	41
3. Backwater	Mean	0.2	0.8	0	83.5	4	19	0	3.18	15.2	114	406	8.7	35.7	36	31.6	7.5	31.8	15.7
	Median	0.2	0.66	0	95	4	0	0	3.2	14.6	114	392	9	28	26	28.3	7	21.4	10.6
	Minimum	0.2	0.3	0	5	1	0	0	0.9	9.2	66	331	7.9	18	8	8.5	2.2	8.89	1.48
	Maximum	0.2	1.8	0.08	100	15	95	2	5	20	152	644	9.2	80	83	76.9	15	92.8	59.7
	Std. dev.	0	0.43	0.02	27.8	3.32	34.9	.61	1.21	3.32	25.2	70.6	0.44	16.2	20.8	17.7	3.69	32.3	13.8
	N obs.	23	23	23	17	17	17	17	23	23	23	23	9	17	23	23	23	6	23
5. Impounded	Mean	0.2	2.02	0	97.9	7	0	0	1.34	14.2	101	472	8.4	50.8	29	21	4.7	9.73	7.06
	Median	0.2	1.9	0	100	7	0	0	1.1	14	101	483	8.4	55	21	17.8	3.8	9.73	7.65
	Minimum	0.2	0.45	0	80	3	0	0	0.6	9.2	66	433	8.2	23	8	6.3	1.2	9.73	1.52
	Maximum	0.2	4.8	0	100	10	0	0	2.3	16.1	113	507	8.8	70	58	50.8	9.7	9.73	9.48
	Std. dev.	0	1.33	0	5.79	1.95	0	0	0.5	1.55	10.9	26.8	0.16	20.2	17.5	14.5	2.5	—	2.34
	N obs.	15	15	15	14	14	14	14	15	15	15	15	13	4	15	15	15	1	15
1995 Near-bottom measurements: winter																			
2. Side channel	Mean	3.3	3.52	—	—	—	—	—	1.15	13.6	96	—	—	—	—	—	—	—	—
	Median	3.25	3.45	—	—	—	—	—	1.05	13.6	95	—	—	—	—	—	—	—	—
	Minimum	0.9	1.18	—	—	—	—	—	1	12.5	89	—	—	—	—	—	—	—	—
	Maximum	5.8	6	—	—	—	—	—	1.5	14.9	105	—	—	—	—	—	—	—	—
	Std. dev.	2.09	2.06	—	—	—	—	—	0.24	1.08	7.13	—	—	—	—	—	—	—	—
	N obs.	4	4	0	—	—	—	—	4	4	4	0	0	—	0	0	0	0	0
3. Backwater	Mean	1.13	1.34	—	—	—	—	—	3.73	15	114	—	—	—	—	—	—	—	—
	Median	1	1.23	—	—	—	—	—	4.4	15.1	118	—	—	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	1.2	13.9	98	—	—	—	—	—	—	—	—
	Maximum	1.6	1.8	—	—	—	—	—	4.9	16	122	—	—	—	—	—	—	—	—
	Std. dev.	0.33	0.32	—	—	—	—	—	1.73	0.95	11.2	—	—	—	—	—	—	—	—
	N obs.	4	4	0	—	—	—	—	4	4	4	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-bottom measurements: winter																			
5. Impounded	Mean	2.32	2.52	—	—	—	—	—	1.52	14.1	101	486	8.3	—	—	—	—	—	—
	Median	1.9	2.1	—	—	—	—	—	1.6	14	101	486	8.3	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	0.5	12.6	91	471	8.2	—	—	—	—	—	—
	Maximum	4.6	4.8	—	—	—	—	—	2.1	15.3	108	501	8.3	—	—	—	—	—	—
	Std. dev.	1.2	1.2	—	—	—	—	—	0.49	0.75	5.17	21.2	0.07	—	—	—	—	—	—
	N obs.	11	11	0	—	—	—	—	11	11	11	2	2	—	0	0	0	0	0
1995 Near-surface measurements: spring																			
1. Main channel	Mean	0.2	6.77	0.68	—	—	—	—	11.7	10.1	93	498	7.9	20.7	90	152	17.7	11.6	18.4
	Median	0.2	6.6	0.6	—	—	—	—	11.9	10.2	94	492	7.9	19.5	86	157	17.4	11.6	17.9
	Minimum	0.2	0.51	0.55	—	—	—	—	10.7	9.1	85	445	7.8	14	51	89.1	11	5.99	14
	Maximum	0.2	14.1	0.88	—	—	—	—	12.6	10.9	99	598	8.1	29	200	218	27.8	17.1	22
	Std. dev.	0	3.66	0.18	—	—	—	—	0.48	0.47	3.76	37.4	0.08	4.33	31.4	36.1	3.89	7.86	2.36
	N obs.	20	20	3	0	0	0	0	20	20	20	20	19	20	20	20	20	2	20
2. Side channel	Mean	0.2	3.91	0.82	—	—	—	—	11.8	10	93	505	7.9	21.1	86	144	17	18.5	19.2
	Median	0.2	4.3	0.85	—	—	—	—	11.7	10.1	93	490	7.9	22	82	141	17	19	18.3
	Minimum	0.2	0.55	0	—	—	—	—	11	8.8	83	439	7.7	14	61	76.2	11.8	15	0
	Maximum	0.2	8.2	1.16	—	—	—	—	13	10.8	99	630	8.1	28	160	238	22	20.5	75.8
	Std. dev.	0	2.1	0.25	—	—	—	—	0.41	0.48	3.91	45.7	0.13	2.95	25.3	36.1	2.6	2.16	9.97
	N obs.	41	41	41	0	0	0	0	41	41	41	41	37	41	41	41	41	5	41
3. Backwater	Mean	0.2	1.23	0.04	—	—	—	—	14.9	11.3	112	448	7.9	32.9	50	68.4	14.9	66.6	62.6
	Median	0.2	1.15	0	—	—	—	—	14.9	10.3	98	431	7.9	35	27	39.4	11.3	54.7	48.7
	Minimum	0.2	0.3	0	—	—	—	—	11.6	5.4	57	343	7.6	10	12	11.5	3.9	12	6.69
	Maximum	0.2	3	0.61	—	—	—	—	20.1	20	209	666	8.2	58	160	189	39.9	162	173
	Std. dev.	0	0.67	0.15	—	—	—	—	2.07	3.71	39.3	73.6	0.17	13.7	43.5	56.1	9.69	56.9	52.6
	N obs.	30	30	30	0	0	0	0	30	30	30	30	9	29	30	30	30	5	30
4. Lake	Mean	0.2	1.74	0	—	—	—	—	14.5	15.3	150	540	8.6	31.3	33	36.2	11.8	—	120
	Median	0.2	1.5	0	—	—	—	—	14.4	15.5	152	515	8.7	28	33	39.8	12.7	—	136
	Minimum	0.2	1.1	0	—	—	—	—	13.2	11.1	109	495	8	22	17	18	4	—	18.4
	Maximum	0.2	3.1	0	—	—	—	—	15.5	18.4	179	658	8.9	47	48	53	16	—	176
	Std. dev.	0	0.69	0	—	—	—	—	0.57	2.24	22.4	52.1	0.34	8.05	7.99	10.1	3.46	—	48.7
	N obs.	15	15	7	0	0	0	0	15	15	15	15	7	15	15	15	15	0	15

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements: spring																			
5. Impounded	Mean	0.2	1.93	0.05	—	—	—	—	13.8	11	107	418	8.5	28.5	64	75.4	12.6	57.7	48.8
	Median	0.2	1.7	0	—	—	—	—	13.6	10.3	100	418	8.4	31	60	57.2	10.9	57.7	55.5
	Minimum	0.2	0.44	0	—	—	—	—	12	9.6	91	394	8.3	14	22	22.1	6.5	57.7	11
	Maximum	0.2	4.3	0.2	—	—	—	—	15.4	14.5	145	441	8.7	44	130	215	26.3	57.7	86.2
	Std. dev.	0	1.12	0.07	—	—	—	—	0.97	1.58	17.2	15.6	0.16	8.98	30	57.7	5.62	—	28.2
	N obs.	15	15	13	0	0	0	0	15	15	15	15	8	15	15	15	15	1	15
1995 Near-bottom measurements: spring																			
2. Side channel	Mean	3.8	4	—	—	—	—	—	11.7	10.2	93	503	8	—	—	—	—	—	—
	Median	3.8	4	—	—	—	—	—	11.7	10.2	93	503	8	—	—	—	—	—	—
	Minimum	3.5	3.7	—	—	—	—	—	11.4	10.1	93	496	7.9	—	—	—	—	—	—
	Maximum	4.1	4.3	—	—	—	—	—	11.9	10.2	94	510	8	—	—	—	—	—	—
	Std. dev.	0.42	0.42	—	—	—	—	—	0.35	0.07	0.11	9.9	0.07	—	—	—	—	—	—
	N obs.	2	2	0	—	—	—	—	2	2	2	2	2	—	0	0	0	0	0
3. Backwater	Mean	1.36	1.57	—	—	—	—	—	14.2	10.8	106	477	7.9	—	—	—	—	—	—
	Median	1.2	1.5	—	—	—	—	—	13.5	10	93	463	8	—	—	—	—	—	—
	Minimum	0.8	1.03	—	—	—	—	—	11.6	5.6	52	382	7.4	—	—	—	—	—	—
	Maximum	2.2	2.4	—	—	—	—	—	18.9	19.8	201	643	8.2	—	—	—	—	—	—
	Std. dev.	0.43	0.42	—	—	—	—	—	2.17	3.99	42.1	75.4	0.26	—	—	—	—	—	—
	N obs.	17	17	0	—	—	—	—	17	17	17	16	8	—	0	0	0	0	0
4. Lake	Mean	1.59	1.74	—	—	—	—	—	13.7	13.8	133	543	8.6	—	160	147	22.8	—	75.8
	Median	1.3	1.5	—	—	—	—	—	13.5	12.8	124	520	8.6	—	160	147	22.8	—	75.8
	Minimum	0.9	1.1	—	—	—	—	—	12.5	9.6	92	506	8.3	—	160	147	22.8	—	75.8
	Maximum	2.9	3.1	—	—	—	—	—	15.2	18.9	186	613	8.9	—	160	147	22.8	—	75.8
	Std. dev.	0.73	0.69	—	—	—	—	—	0.76	2.62	27.1	38.1	0.22	—	—	—	—	—	—
	N obs.	15	15	0	—	—	—	—	15	15	15	15	7	—	1	1	1	0	1
5. Impounded	Mean	2.04	2.24	—	—	—	—	—	13.2	10.7	102	418	8.4	—	—	—	—	—	—
	Median	1.5	1.7	—	—	—	—	—	12.9	10.2	98	418	8.4	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	12	9.6	90	395	8.2	—	—	—	—	—	—
	Maximum	4.1	4.3	—	—	—	—	—	14.2	12.6	122	435	8.5	—	—	—	—	—	—
	Std. dev.	1.1	1.1	—	—	—	—	—	0.68	1.14	11.5	14	0.12	—	—	—	—	—	—
	N obs.	11	11	0	—	—	—	—	11	11	11	11	5	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements: summer																			
1. Main channel	Mean	0.2	5.43	0.26	—	—	—	—	28.9	7.89	104	524	8.2	39.2	31	37.6	7.3	62.3	28.4
	Median	0.2	4.9	0.26	—	—	—	—	28.8	8	106	514	8.2	41	31	37.1	6.9	62.3	26.2
	Minimum	0.2	1.2	0	—	—	—	—	28	6.3	82	472	7.9	26	21	22.1	4.5	41.7	18
	Maximum	0.2	12.2	0.52	—	—	—	—	31.5	9.8	135	603	8.5	50	47	57.5	18.5	83	44
	Std. dev.	0	2.81	0.37	—	—	—	—	0.81	0.83	12.4	33.4	0.14	6.68	7.06	10.9	2.76	29.2	5.77
	N obs.	21	21	2	0	0	0	0	21	21	21	18	21	21	21	21	21	2	21
2. Side channel	Mean	0.2	3.68	0.48	—	—	—	—	29	7.99	106	514	8.2	37	32	43.4	7.6	39.8	32.2
	Median	0.2	3.4	0.48	—	—	—	—	28.9	7.8	103	502	8.2	37.5	30	43.3	7.4	34.7	30.8
	Minimum	0.2	0.55	0	—	—	—	—	28	6.2	81	398	8	22	21	20	4.9	32.2	18.8
	Maximum	0.2	8.8	1.01	—	—	—	—	31.1	13.7	187	609	8.8	51	45	68.8	17.3	52.7	114
	Std. dev.	0	2.02	0.22	—	—	—	—	0.84	1.24	17.8	45.7	0.16	6.36	6.06	11.2	1.97	11.2	14.8
	N obs.	40	40	40	0	0	0	0	40	40	40	32	40	40	40	40	40	3	40
3. Backwater	Mean	0.2	0.8	0.01	—	—	—	—	31.1	9.71	135	473	8.3	18.7	99	87.5	22.2	91.4	119
	Median	0.2	0.65	0	—	—	—	—	31.1	7.8	103	480	8.2	19	78	74.9	19.9	83.5	101
	Minimum	0.2	0.32	0	—	—	—	—	27.9	4.3	61	366	7.7	10	30	24.3	5.9	61.8	21.4
	Maximum	0.2	3.4	0.33	—	—	—	—	38.3	25	373	567	8.9	43	230	201	40.2	129	243
	Std. dev.	0	0.59	0.06	—	—	—	—	2.25	5.8	83.9	49.5	0.33	6.93	59.8	45	9.83	34.2	66.4
	N obs.	29	29	29	0	0	0	0	29	29	29	28	29	29	29	29	29	3	29
4. Lake	Mean	0.2	0.6	0	—	—	—	—	29.2	11	148	543	8.4	15	116	108	27	121	190
	Median	0.2	0.51	0	—	—	—	—	28.3	9.4	120	526	8.5	15	98	104	26.8	115	175
	Minimum	0.2	0.35	0	—	—	—	—	27.4	5.2	68	486	7.9	12	77	54.2	19.5	48.7	158
	Maximum	0.2	1.03	0	—	—	—	—	32.4	25	353	656	9.1	20	160	191	37.5	208	276
	Std. dev.	0	0.23	0	—	—	—	—	1.73	6.29	90.3	44.5	0.39	2.1	35.2	33.9	6.04	45.6	44
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	10	6
5. Impounded	Mean	0.2	2.04	0.02	—	—	—	—	30.6	12.8	177	468	8.4	37	31	33.4	9	54.3	53.4
	Median	0.2	1.6	0	—	—	—	—	30.6	9.9	129	464	8.4	35	30	32.8	8.4	54.3	44
	Minimum	0.2	0.55	0	—	—	—	—	28.3	7.7	101	416	8.1	23	17	14.8	6.3	43.4	24.8
	Maximum	0.2	4.7	0.15	—	—	—	—	33.5	25	362	524	8.8	53	58	65	14.7	65.2	98.5
	Std. dev.	0	1.25	0.04	—	—	—	—	1.39	6.5	94.2	33.3	0.21	10.4	10.6	14.3	2.39	15.4	24.1
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Middepth measurements: summer																			
3. Backwater	Mean	0.8	1.09	—	—	—	—	—	29.9	3.9	52	488	7.9	—	—	—	—	—	—
	Median	0.8	1.09	—	—	—	—	—	29.9	3.9	52	488	7.9	—	—	—	—	—	—
	Minimum	0.8	1.09	—	—	—	—	—	29.9	3.9	52	488	7.9	—	—	—	—	—	—
	Maximum	0.8	1.09	—	—	—	—	—	29.9	3.9	52	488	7.9	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	1	1	—	0	0	0	0	0
5. Impounded	Mean	2.3	4.7	—	—	—	—	—	29.5	7.1	95	480	8.1	—	—	—	—	—	—
	Median	2.3	4.7	—	—	—	—	—	29.5	7.1	95	480	8.1	—	—	—	—	—	—
	Minimum	2.3	4.7	—	—	—	—	—	29.5	7.1	95	480	8.1	—	—	—	—	—	—
	Maximum	2.3	4.7	—	—	—	—	—	29.5	7.1	95	480	8.1	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	1	1	—	0	0	0	0	0
1995 Near-bottom measurements: summer																			
2. Side channel	Mean	2.98	3.18	—	—	—	—	—	28.9	7.71	102	513	8.1	—	—	—	—	—	—
	Median	2.5	2.7	—	—	—	—	—	28.9	7.7	101	502	8.2	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	28	6	79	459	7.9	—	—	—	—	—	—
	Maximum	8.6	8.8	—	—	—	—	—	30.4	9.9	134	607	8.4	—	—	—	—	—	—
	Std. dev.	1.7	1.7	—	—	—	—	—	0.69	0.93	13.3	42.2	0.16	—	—	—	—	—	—
	N obs.	24	24	0	—	—	—	—	24	24	24	17	18	—	0	0	0	0	0
3. Backwater	Mean	1.38	1.6	—	—	—	—	—	30.8	5.25	73	486	7.8	—	—	—	—	—	—
	Median	1	1.23	—	—	—	—	—	29.8	4.85	65	493	7.9	—	—	—	—	—	—
	Minimum	0.9	1.1	—	—	—	—	—	27.8	3.8	52	440	7.5	—	—	—	—	—	—
	Maximum	3.2	3.4	—	—	—	—	—	38.3	8.3	133	510	8.2	—	—	—	—	—	—
	Std. dev.	0.9	0.89	—	—	—	—	—	3.86	1.56	29.6	27.2	0.29	—	—	—	—	—	—
	N obs.	6	6	0	—	—	—	—	6	6	6	5	5	—	0	0	0	0	0
4. Lake	Mean	0.8	1.03	—	—	—	—	—	28.1	6	78	533	8.2	—	—	—	—	—	—
	Median	0.8	1.03	—	—	—	—	—	28.1	6	78	533	8.2	—	—	—	—	—	—
	Minimum	0.8	1.03	—	—	—	—	—	28.1	6	78	533	8.2	—	—	—	—	—	—
	Maximum	0.8	1.03	—	—	—	—	—	28.1	6	78	533	8.2	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	1	1	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-bottom measurements: summer																			
5. Impounded	Mean	2.14	2.35	—	—	—	—	—	29.9	8.66	118	477	8.1	—	38	64.5	12.7	43.2	47.4
	Median	1.7	1.9	—	—	—	—	—	29.5	7.75	102	475	8.2	—	28	77.6	14.8	43.2	42.8
	Minimum	0.9	1.18	—	—	—	—	—	28.1	2.9	38	420	7.7	—	24	21.5	7.1	43.2	37.2
	Maximum	4.5	4.7	—	—	—	—	—	33.4	25	361	514	8.7	—	71	114	17	43.2	68.3
	Std. dev.	1.21	1.2	—	—	—	—	—	1.32	5.49	80.9	30	0.26	—	22.4	39.1	4.62	—	12.2
	N obs.	12	12	0	—	—	—	—	12	12	12	11	12	—	4	5	5	1	5
1995 Near-surface measurements: fall																			
1. Main channel	Mean	0.2	5.48	—	—	—	—	—	17	9.56	99	412	7.9	40.2	27	39	5.7	13.8	14.2
	Median	0.2	5.9	—	—	—	—	—	17.2	9.6	99	400	7.9	40	24	33.8	5	13.8	13.5
	Minimum	0.2	0.54	—	—	—	—	—	15.7	9.1	96	390	7.3	25	16	17.5	3.5	13.8	9.76
	Maximum	0.2	11.6	—	—	—	—	—	18.1	10	104	514	8	59	52	84.2	10.6	13.8	23.7
	Std. dev.	0	2.58	—	—	—	—	—	0.68	0.21	1.95	28.2	0.14	9.91	10	20.6	2.27	—	3.59
	N obs.	21	21	0	0	0	0	0	21	21	21	21	21	21	21	21	21	1	21
2. Side channel	Mean	0.2	3.48	0.41	—	—	—	—	16.8	9.67	100	429	7.9	36	32	46.1	6.8	15.3	16.8
	Median	0.2	3.4	0.42	—	—	—	—	17	9.6	99	408	7.8	34	27	38.8	5.9	13.6	15.3
	Minimum	0.2	0.5	0	—	—	—	—	15.2	8.4	85	391	7.7	14	15	9.9	2.3	10.8	0
	Maximum	0.2	7.3	0.8	—	—	—	—	19	14.3	148	551	8.7	59	60	88.6	12.1	23.1	69.4
	Std. dev.	0	1.99	0.21	—	—	—	—	0.8	0.89	8.92	49.4	0.17	9.36	12.1	19.8	2.28	5.52	10.1
	N obs.	41	41	41	0	0	0	0	41	41	41	41	40	41	41	41	41	4	41
3. Backwater	Mean	0.2	0.69	0	—	—	—	—	16.8	9.18	95	489	8.1	20	70	80.7	15	51.1	52.9
	Median	0.2	0.65	0	—	—	—	—	16.3	9.4	101	439	8.1	18	60	62.1	13.9	40	53.3
	Minimum	0.2	0.3	0	—	—	—	—	14	5.1	54	408	7.4	9	23	24.3	5.9	28.1	12.5
	Maximum	0.2	1	0	—	—	—	—	21.3	13.4	138	729	8.7	35	180	243	33.7	96.2	111
	Std. dev.	0	0.21	0	—	—	—	—	1.87	2.07	21.3	103	0.36	7.29	40.5	53.8	7.08	30.6	24.2
	N obs.	29	29	29	0	0	0	0	29	29	29	28	29	29	29	29	29	4	29
4. Lake	Mean	0.2	0.61	0	—	—	—	—	17.9	14.2	151	620	8.8	18.6	59	71.2	22.1	195	114
	Median	0.2	0.6	0	—	—	—	—	17	11.4	123	597	8.8	18	58	72.1	22	195	109
	Minimum	0.2	0.31	0	—	—	—	—	15.9	9.4	95	562	8.5	14	32	56.6	13.6	195	57.9
	Maximum	0.2	1.05	0	—	—	—	—	20.3	25	277	708	9.3	25	79	92.3	30.3	195	173
	Std. dev.	0	0.2	0	—	—	—	—	1.67	5.71	64.2	50.6	0.22	2.77	10.4	10.6	4.11	—	35.7
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	1	15

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1995 Near-surface measurements: fall																			
5. Impounded	Mean	0.2	2.31	0	—	—	—	—	18	9.97	106	409	8.1	30.7	29	31.6	5.8	14.4	17.7
	Median	0.2	1.8	0	—	—	—	—	18.1	9.9	106	411	8.1	31	26	29.6	5.5	14.4	16.4
	Minimum	0.2	0.98	0	—	—	—	—	15.7	8.6	87	394	7.9	24	20	19.3	4.3	12.4	11.2
	Maximum	0.2	4.8	0	—	—	—	—	21.1	12.2	135	414	8.4	39	46	54.7	8.1	16.5	42.3
	Std. dev.	0	1.32	0	—	—	—	—	1.72	0.94	13.5	5.78	0.15	4.33	7.33	9.52	1.14	2.85	7.79
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15
1995 Near-bottom measurements: fall																			
2. Side channel	Mean	3.16	3.36	—	—	—	—	—	17	9.32	96	444	7.9	—	—	—	—	—	—
	Median	3.2	3.4	—	—	—	—	—	17.2	9.4	97	411	7.8	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	15.8	8.2	86	391	7.7	—	—	—	—	—	—
	Maximum	6.8	7	—	—	—	—	—	18.4	10.6	107	551	8.5	—	—	—	—	—	—
	Std. dev.	1.89	1.89	—	—	—	—	—	0.75	0.63	5.42	59	0.16	—	—	—	—	—	—
	N obs.	21	21	0	—	—	—	—	21	21	21	21	21	—	0	0	0	0	0
3. Backwater	Mean	0.8	1	—	—	—	—	—	16.3	7.8	80	—	—	—	—	—	—	—	—
	Median	0.8	1	—	—	—	—	—	16.3	7.8	80	—	—	—	—	—	—	—	—
	Minimum	0.8	1	—	—	—	—	—	16.3	7.8	80	—	—	—	—	—	—	—	—
	Maximum	0.8	1	—	—	—	—	—	16.3	7.8	80	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0
4. Lake	Mean	0.8	1.05	—	—	—	—	—	16.2	7.6	77	593	—	—	—	—	—	—	—
	Median	0.8	1.05	—	—	—	—	—	16.2	7.6	77	593	—	—	—	—	—	—	—
	Minimum	0.8	1.05	—	—	—	—	—	16.2	7.6	77	593	—	—	—	—	—	—	—
	Maximum	0.8	1.05	—	—	—	—	—	16.2	7.6	77	593	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	1	0	—	0	0	0	0	0
5. Impounded	Mean	2.21	2.41	—	—	—	—	—	17.6	9.19	97	410	8	—	—	—	—	—	—
	Median	1.6	1.8	—	—	—	—	—	17.5	9.25	97	412	8	—	—	—	—	—	—
	Minimum	0.8	1.04	—	—	—	—	—	15.8	7.6	80	393	7.8	—	—	—	—	—	—
	Maximum	4.6	4.8	—	—	—	—	—	19.4	10.6	115	418	8.4	—	—	—	—	—	—
	Std. dev.	1.32	1.32	—	—	—	—	—	1.34	0.89	11.4	6.87	0.17	—	—	—	—	—	—
	N obs.	14	14	0	—	—	—	—	14	14	14	14	14	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements: winter																			
1. Main channel	Mean	0.2	6.97	0	53.9	10	1	0	0.2	12.9	89	515	7.7	62.4	24	31.3	4.6	6.35	5.48
	Median	0.2	6.5	0	60	11	0	0	0.1	12.6	86	492	7.6	37	27	33.7	4.9	6.35	5.96
	Minimum	0.2	0.5	0	5	2	0	0	0	12.1	83	298	7.4	19	5	3.9	1.2	6.35	1.23
	Maximum	0.2	15.7	0	100	20	20	2	2.1	15.1	104	953	8.8	174	54	67.1	9.6	6.35	9.84
	Std. dev.	0	4.12	—	31.7	3.86	4.59	.46	0.46	0.84	6.47	122	0.39	49.8	14	21.2	2.46	—	2.36
	N obs.	20	20	1	19	19	19	19	20	20	20	20	20	19	20	20	20	1	18
2. Side channel	Mean	0.2	3.53	0.36	57	12	9	0	0.11	13.2	90	490	7.7	50.8	20	25.6	4.3	4.69	6.2
	Median	0.2	3	0.22	55	9	0	0	0	12.6	86	479	7.6	39	22	28.2	5	4.62	4.94
	Minimum	0.2	0.46	0	5	1	0	0	0	12	82	110	7.4	27	5	3.8	1.3	3.08	1.44
	Maximum	0.2	10.1	0.72	100	25	100	2	1	20	141	641	8.9	121	35	49.3	8.7	5.99	45.8
	Std. dev.	0	2.28	0.27	37.5	6.66	23.8	.59	0.22	1.83	13.3	129	0.44	24.5	10.5	15.8	1.97	1.25	7.64
	N obs.	37	37	35	37	37	37	37	37	37	37	37	36	32	37	37	37	5	36
3. Backwater	Mean	0.2	0.71	0	96.3	17	42	1	2.68	17.9	132	539	8.5	44.8	18	16.7	5.6	10.4	20.8
	Median	0.2	0.71	0	100	17	25	1	3	19	139	519	8.5	45	17	14.7	5.6	11.4	18.5
	Minimum	0.2	0.31	0	15	3	0	0	0.2	4.6	34	250	7.8	20	5	4.7	2	4.09	1.75
	Maximum	0.2	1.24	0	100	25	100	3	4.5	25	192	893	8.8	66	95	61.1	10.6	14.5	77.7
	Std. dev.	0	0.23	0	14.7	4.26	37.8	.76	1.38	3.65	28	122	0.31	11.7	15.8	11.1	2.18	4.8	15.3
	N obs.	34	34	34	34	34	34	34	34	34	34	34	20	24	34	34	34	4	33
5. Impounded	Mean	0.2	1.62	0	99.3	17	45	1	0.44	14	97	576	8	84.1	9	6	2.2	5.13	6.34
	Median	0.2	1.5	0	100	17	35	1	0.4	14.1	97	556	8	80	9	6.6	2.2	5.13	5.87
	Minimum	0.2	0.43	0	90	10	0	0	0	12.5	86	540	7.7	65	4	3	1.5	5.13	3.16
	Maximum	0.2	3.5	0	100	23	100	2	0.8	14.8	104	710	8.2	117	13	8.2	2.8	5.13	13.9
	Std. dev.	0	1.03	0	2.58	4.19	42.9	.86	0.24	0.56	4.02	49.8	0.15	17.4	2.67	1.78	0.38	—	2.63
	N obs.	15	15	15	15	15	15	15	15	15	15	15	15	9	15	15	15	1	15
1996 Near-bottom measurements: winter																			
1. Main channel	Mean	1.2	1.4	—	—	—	—	—	0.5	14.9	103	—	—	—	—	—	—	—	—
	Median	1.2	1.4	—	—	—	—	—	0.5	14.9	103	—	—	—	—	—	—	—	—
	Minimum	1.2	1.4	—	—	—	—	—	0.5	14.9	103	—	—	—	—	—	—	—	—
	Maximum	1.2	1.4	—	—	—	—	—	0.5	14.9	103	—	—	—	—	—	—	—	—
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	0	—	—	—	—	1	1	1	0	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-bottom measurements: winter																			
2. Side channel	Mean	3.81	4.01	—	—	—	—	—	0.05	12.5	85	538	7.6	—	—	—	—	—	—
	Median	3.4	3.6	—	—	—	—	—	0	12.6	86	517	7.6	—	—	—	—	—	—
	Minimum	1.2	1.4	—	—	—	—	—	0	12.1	83	362	7.4	—	—	—	—	—	—
	Maximum	7.4	7.6	—	—	—	—	—	0.3	12.9	89	641	7.8	—	—	—	—	—	—
	Std. dev.	1.98	1.98	—	—	—	—	—	0.07	0.3	2.11	89.5	0.13	—	—	—	—	—	—
	N obs.	21	21	0	—	—	—	—	21	21	21	21	21	—	0	0	0	0	0
3. Backwater	Mean	0.9	1.16	—	—	—	—	—	3.65	15.5	117	514	—	—	—	—	—	—	—
	Median	0.9	1.16	—	—	—	—	—	3.65	15.5	117	514	—	—	—	—	—	—	—
	Minimum	0.8	1.07	—	—	—	—	—	3.1	13.9	104	490	—	—	—	—	—	—	—
	Maximum	1	1.24	—	—	—	—	—	4.2	17	130	537	—	—	—	—	—	—	—
	Std. dev.	0.14	0.12	—	—	—	—	—	0.78	2.19	19	33.2	—	—	—	—	—	—	—
	N obs.	2	2	0	—	—	—	—	2	2	2	2	0	—	0	0	0	0	0
5. Impounded	Mean	2.04	2.24	—	—	—	—	—	0.9	13.9	97	557	7.9	—	—	—	—	—	—
	Median	1.8	2	—	—	—	—	—	0.9	13.8	98	556	7.9	—	—	—	—	—	—
	Minimum	1.1	1.3	—	—	—	—	—	0.2	13.3	92	544	7.9	—	—	—	—	—	—
	Maximum	3.3	3.5	—	—	—	—	—	1.7	14.8	105	572	8	—	—	—	—	—	—
	Std. dev.	0.85	0.85	—	—	—	—	—	0.47	0.48	3.82	7.71	0.05	—	—	—	—	—	—
	N obs.	9	9	0	—	—	—	—	9	9	9	8	8	—	0	0	0	0	0
1996 Near-surface measurements: spring																			
1. Main channel	Mean	0.2	5.86	0.6	—	—	—	—	12.5	10.5	98	384	7.9	25.9	97	170	17.5	20.4	34.6
	Median	0.2	5.8	0.6	—	—	—	—	12.5	10.4	97	376	8	25	68	136	15.8	20.4	33.1
	Minimum	0.2	1.5	0.6	—	—	—	—	11.3	9.1	85	282	7.5	13	27	43.6	7.7	19.2	18.8
	Maximum	0.2	10.7	0.6	—	—	—	—	14	12.4	118	593	8.3	76	330	491	42.9	21.5	59
	Std. dev.	0	2.68	—	—	—	—	—	0.71	0.95	9.67	70.4	0.26	13.7	77.8	109	8.38	1.63	11.2
	N obs.	21	21	1	0	0	0	0	21	21	21	21	21	21	21	21	21	2	21
2. Side channel	Mean	0.2	4.09	0.75	—	—	—	—	12.6	10.1	95	386	7.9	22.1	97	160	17.9	18.5	35.4
	Median	0.2	4	0.82	—	—	—	—	12.5	10.5	97	373	7.9	23	66	130	15.7	16.5	36.4
	Minimum	0.2	0.38	0	—	—	—	—	11.3	5.6	57	241	7.5	9	37	61.8	9.6	13.4	17.1
	Maximum	0.2	10.1	1.3	—	—	—	—	16.2	11	103	698	8.2	34	290	601	61.3	31.3	62.2
	Std. dev.	0	2.36	0.34	—	—	—	—	0.99	1	8.36	94	0.19	6.87	66.7	98.5	9.2	7.38	11.1
	N obs.	41	41	41	0	0	0	0	41	41	41	41	41	41	41	41	41	5	41

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements: spring																			
3. Backwater	Mean	0.2	0.94	0.04	—	—	—	—	15.4	9.25	93	313	7.9	19.1	152	154	22	14.4	30
	Median	0.2	0.78	0	—	—	—	—	16.1	9.1	92	333	8	12.5	175	135	19.2	14.4	26.6
	Minimum	0.2	0.3	0	—	—	—	—	11.5	5.4	55	153	7.1	7	10	11.5	4	14.3	6.26
	Maximum	0.2	2.4	0.59	—	—	—	—	18.6	25	262	515	8.9	66	300	425	49.3	14.5	72
	Std. dev.	0	0.54	0.11	—	—	—	—	2.02	3.6	37.3	81	0.51	14.5	98.9	108	12.5	0.18	16.6
	N obs.	30	30	30	0	0	0	0	30	30	30	30	30	30	30	29	29	2	29
4. Lake	Mean	0.2	1.12	0	—	—	—	—	14.9	11.3	113	607	8.2	15.9	119	113	19.3	78	73.5
	Median	0.2	1.45	0	—	—	—	—	13.9	10.4	101	614	8.1	15	95	85.4	14.8	78	82.1
	Minimum	0.2	0.28	0	—	—	—	—	12.8	8.7	83	490	7.7	11	45	48.9	7.1	75.8	10.8
	Maximum	0.2	1.6	0	—	—	—	—	17.9	15.9	166	851	8.8	27	290	356	54.5	80.2	121
	Std. dev.	0	0.55	0	—	—	—	—	2.03	2.26	26.7	108	0.3	3.79	71.2	76.3	11.8	3.09	41.1
	N obs.	14	14	14	0	0	0	0	14	14	14	14	14	14	14	14	14	2	14
5. Impounded	Mean	0.2	1.89	0.05	—	—	—	—	14.2	10.8	105	363	8.5	24.4	64	75.5	11.5	12.3	23
	Median	0.2	1.8	0	—	—	—	—	14.1	10.8	107	372	8.5	25	56	53.2	9.9	12.3	25.5
	Minimum	0.2	0.35	0	—	—	—	—	12.6	9.1	86	287	8.2	12	35	41.1	6.4	8.33	14.9
	Maximum	0.2	3.4	0.73	—	—	—	—	15.5	12.2	117	399	8.6	30	210	291	29.8	16.4	30.5
	Std. dev.	0	1.04	0.2	—	—	—	—	0.99	0.9	10	32.8	0.11	5.28	43.3	62.8	5.68	5.67	5.38
	N obs.	15	15	14	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15
1996 Middepth measurements: spring																			
4. Lake	Mean	0.4	1.6	0	—	—	—	—	13.9	10.3	100	484	8.1	—	150	337	17.8	—	86.3
	Median	0.4	1.6	0	—	—	—	—	13.9	10.3	100	484	8.1	—	150	337	17.8	—	86.3
	Minimum	0.4	1.6	0	—	—	—	—	13.9	10.3	100	484	8.1	—	150	337	17.8	—	86.3
	Maximum	0.4	1.6	0	—	—	—	—	13.9	10.3	100	484	8.1	—	150	337	17.8	—	86.3
	Std. dev.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	N obs.	1	1	1	—	—	—	—	1	1	1	1	1	—	1	1	1	0	1
1996 Near-bottom measurements: spring																			
2. Side channel	Mean	2.87	3.07	—	—	—	—	—	12.9	9.87	93	438	8	—	—	—	—	—	—
	Median	2.8	3	—	—	—	—	—	12.6	10.1	95	375	8	—	—	—	—	—	—
	Minimum	1.6	1.8	—	—	—	—	—	11.4	8.2	80	331	7.6	—	—	—	—	—	—
	Maximum	5	5.2	—	—	—	—	—	14.8	10.8	101	698	8.1	—	—	—	—	—	—
	Std. dev.	1.11	1.11	—	—	—	—	—	0.95	0.93	7.33	130	0.14	—	—	—	—	—	—
	N obs.	15	15	0	—	—	—	—	15	15	15	15	15	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-bottom measurements: spring																			
3. Backwater	Mean	1.24	1.47	—	—	—	—	—	14.8	7.84	77	308	7.6	—	18	19.6	8.8	—	82.7
	Median	1	1.25	—	—	—	—	—	15.7	6.2	64	310	7.4	—	18	19.6	8.8	—	82.7
	Minimum	0.8	1.07	—	—	—	—	—	11.1	4.6	47	207	7.1	—	18	19.6	8.8	—	82.7
	Maximum	2.2	2.4	—	—	—	—	—	16.9	15	151	403	8.7	—	18	19.6	8.8	—	82.7
	Std. dev.	0.52	0.5	—	—	—	—	—	2	3.31	32.2	82.9	0.56	—	—	—	—	—	—
	N obs.	9	9	0	—	—	—	—	9	9	9	8	8	—	1	1	1	0	1
4. Lake	Mean	1.32	1.52	—	—	—	—	—	13.3	9.77	93	547	8	—	—	—	—	—	—
	Median	1.3	1.5	—	—	—	—	—	13.4	9.9	95	498	8.1	—	—	—	—	—	—
	Minimum	1.2	1.4	—	—	—	—	—	12.6	8.3	78	484	7.7	—	—	—	—	—	—
	Maximum	1.4	1.6	—	—	—	—	—	13.9	11.7	110	651	8.4	—	—	—	—	—	—
	Std. dev.	0.08	0.08	—	—	—	—	—	0.44	0.96	9.26	73.5	0.19	—	—	—	—	—	—
	N obs.	10	10	0	—	—	—	—	10	10	10	10	10	—	0	0	0	0	0
5. Impounded	Mean	2.3	2.5	—	—	—	—	—	13.9	10.6	103	—	—	—	—	—	—	—	—
	Median	2.5	2.7	—	—	—	—	—	14.1	10.8	107	—	—	—	—	—	—	—	—
	Minimum	1.3	1.5	—	—	—	—	—	12.5	9	84	—	—	—	—	—	—	—	—
	Maximum	3.2	3.4	—	—	—	—	—	14.9	12.2	116	—	—	—	—	—	—	—	—
	Std. dev.	0.65	0.65	—	—	—	—	—	0.96	0.96	10.4	—	—	—	—	—	—	—	—
	N obs.	10	10	0	—	—	—	—	10	10	10	0	0	—	0	0	0	0	0
1996 Near-surface measurements: summer																			
1. Main channel	Mean	0.2	5.9	—	—	—	—	—	25.9	5.99	74	508	7.8	21.1	83	116	13.8	—	11.8
	Median	0.2	5.6	—	—	—	—	—	26.2	6	75	498	7.8	21	75	121	14.3	—	11
	Minimum	0.2	1.2	—	—	—	—	—	24.7	3.1	39	443	7.5	10	32	39.5	6.3	—	7.49
	Maximum	0.2	13.2	—	—	—	—	—	26.6	7.5	92	699	8	31	220	164	20.2	—	19.9
	Std. dev.	0	3.17	—	—	—	—	—	0.55	1.13	13.9	64.7	0.17	5.67	47.4	32.1	3.92	—	2.91
	N obs.	20	20	0	0	0	0	0	20	15	15	20	20	20	20	20	20	0	20
2. Side channel	Mean	0.2	3.38	0.6	—	—	—	—	25.7	6.83	84	481	7.8	24.8	65	95.2	11.2	23.1	10.1
	Median	0.2	2.65	0.65	—	—	—	—	25.8	7.4	90	464	7.8	25	48	76.5	10	13.6	10
	Minimum	0.2	0.65	0.11	—	—	—	—	24.9	3.5	44	441	7.5	11	29	34.3	5.3	8.6	5.65
	Maximum	0.2	9.5	1.05	—	—	—	—	27	7.9	98	664	8.2	37	320	177	19.9	67.4	19.5
	Std. dev.	0	2.29	0.22	—	—	—	—	0.51	1.12	13.5	52.4	0.14	6.71	49.7	43	4.07	22.3	3.19
	N obs.	42	42	42	0	0	0	0	42	35	35	42	42	42	41	42	42	6	42

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-surface measurements: summer																			
3. Backwater	Mean	0.2	0.61	0	—	—	—	—	27.3	8.89	115	490	8.1	14.1	108	123	26.7	113	103
	Median	0.2	0.49	0	—	—	—	—	27	7.9	97	479	8.1	14	86	107	24.1	113	80.9
	Minimum	0.2	0.3	0	—	—	—	—	22.8	4.7	57	392	7.5	9	24	23.4	4.9	77.3	11.2
	Maximum	0.2	2.3	0	—	—	—	—	30.7	25	329	603	9	36	270	262	51	149	251
	Std. dev.	0	0.38	0	—	—	—	—	1.99	5.17	69.4	54.5	0.42	5.2	54.8	58.9	12.1	50.6	53.4
	N obs.	29	29	29	0	0	0	0	29	27	27	29	29	29	29	29	29	2	29
4. Lake	Mean	0.2	0.61	0	—	—	—	—	26.9	9.01	114	543	8.6	15.7	82	100	21.8	52.2	96
	Median	0.2	0.6	0	—	—	—	—	26.7	8.5	107	550	8.6	16	74	103	21.1	52.2	96.2
	Minimum	0.2	0.37	0	—	—	—	—	25.2	6.8	85	486	8.3	11	49	54.7	15.3	46.5	60.9
	Maximum	0.2	0.8	0	—	—	—	—	29	11.8	156	582	9	19	180	146	31.6	58	130
	Std. dev.	0	0.13	0	—	—	—	—	1.08	1.62	21.7	28	0.21	1.91	32.1	23.4	3.56	8.11	17.8
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15
5. Impounded	Mean	0.2	1.65	0.02	—	—	—	—	27.5	11	142	480	8.2	24.3	45	58.7	11.2	26.8	47.3
	Median	0.2	0.95	0	—	—	—	—	27.4	9	115	486	8.2	25	44	52.1	8.9	26.8	32.7
	Minimum	0.2	0.35	0	—	—	—	—	26.4	6.2	78	410	7.9	11	23	28.3	7.5	23.8	11.8
	Maximum	0.2	4.1	0.16	—	—	—	—	29	25	329	504	8.8	33	79	106	30.1	29.9	202
	Std. dev.	0	1.36	0.05	—	—	—	—	0.88	5.9	78.3	23	0.29	6.3	16.7	25.9	5.76	4.33	49.1
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15
1996 Near-bottom measurements: summer																			
2. Side channel	Mean	1.95	2.15	—	—	—	—	—	25.6	6.62	82	487	7.8	—	—	—	—	—	—
	Median	1.7	1.9	—	—	—	—	—	25.5	7.3	90	452	7.8	—	—	—	—	—	—
	Minimum	1	1.2	—	—	—	—	—	24.9	3.4	43	441	7.5	—	—	—	—	—	—
	Maximum	5.9	6.1	—	—	—	—	—	26.8	7.9	98	665	7.9	—	—	—	—	—	—
	Std. dev.	1.15	1.14	—	—	—	—	—	0.53	1.42	17.2	77.3	0.11	—	—	—	—	—	—
	N obs.	20	20	0	—	—	—	—	20	18	18	18	18	—	0	0	0	0	0
3. Backwater	Mean	1.45	1.66	—	—	—	—	—	27.7	7	92	602	—	—	—	—	—	—	—
	Median	1.45	1.66	—	—	—	—	—	27.7	7	92	602	—	—	—	—	—	—	—
	Minimum	0.8	1.02	—	—	—	—	—	26.5	7	92	602	—	—	—	—	—	—	—
	Maximum	2.1	2.3	—	—	—	—	—	28.9	7	92	602	—	—	—	—	—	—	—
	Std. dev.	0.92	0.91	—	—	—	—	—	1.7	—	—	—	—	—	—	—	—	—	—
	N obs.	2	2	0	—	—	—	—	2	1	1	1	0	—	0	0	0	0	0

Table F-1. Continued.

Sampling stratum	Statistic	Sample depth (m)	Water depth (m)	Water velocity (m/s)	Ice cover (%)	Thickness of ice (cm)	Snow cover (%)	Snow depth (cm)	Water temp. (°C)	Dissolved oxygen (mg/L)	Oxygen saturation (%)	Specific cond. (µS)	pH	Secchi depth (cm)	Turbidity (NTU)	Total suspended solids (mg/L)	Volatile suspended solids (mg/L)	Spectr. chl. (µg/L)	Fluor. chl. (µg/L)
1996 Near-bottom measurements: summer																			
5. Impounded	Mean	2.92	3.12	—	—	—	—	—	26.3	7.18	90	489	7.9	—	—	—	—	—	—
	Median	3	3.2	—	—	—	—	—	26.5	7.4	93	486	8	—	—	—	—	—	—
	Minimum	1.3	1.5	—	—	—	—	—	25.2	4.6	56	486	7.8	—	—	—	—	—	—
	Maximum	3.9	4.1	—	—	—	—	—	27	9	114	498	8	—	—	—	—	—	—
	Std. dev.	0.9	0.9	—	—	—	—	—	0.66	1.51	20	6	0.12	—	—	—	—	—	—
	N obs.	6	6	0	—	—	—	—	6	6	6	4	3	—	0	0	0	0	0
1996 Near-surface measurements: fall																			
1. Main channel	Mean	0.2	6.09	—	—	—	—	—	17.2	9.28	96	451	8.2	54.4	15	19.8	4.3	10.9	12
	Median	0.2	5.5	—	—	—	—	—	17.3	9.6	98	442	8.2	55.5	15	19.3	4.4	10.9	11.3
	Minimum	0.2	1.5	—	—	—	—	—	15.9	8.3	87	419	7.8	42	12	15.4	2.6	8.44	7.84
	Maximum	0.2	14	—	—	—	—	—	19.4	9.8	104	509	8.5	67	18	33.4	9	13.3	17.8
	Std. dev.	0	3.26	—	—	—	—	—	1.05	0.57	5.43	32.5	0.18	6.96	1.42	3.83	1.33	3.44	2.73
	N obs.	20	20	0	0	0	0	0	20	20	20	20	20	20	20	20	20	2	20
2. Side channel	Mean	0.2	3.87	0.2	—	—	—	—	17	9.39	97	439	8.1	55.5	17	23.4	4.6	10.1	12.2
	Median	0.2	3.6	0.22	—	—	—	—	16.8	9.6	99	422	8.2	57	14	20.4	4.1	10.4	10.6
	Minimum	0.2	0.45	0	—	—	—	—	14	7.6	74	413	7.8	24	10	14.3	2.7	7.34	0
	Maximum	0.2	9.5	0.45	—	—	—	—	19.7	10.2	110	549	8.5	76	51	54.6	12.5	11.8	37.1
	Std. dev.	0	2.37	0.11	—	—	—	—	0.99	0.63	6.63	41.3	0.14	13	8.2	9.35	1.62	1.71	5.82
	N obs.	42	42	38	0	0	0	0	42	42	42	42	42	42	42	42	42	5	42
3. Backwater	Mean	0.2	0.99	0	—	—	—	—	17.8	9.13	97	451	8.3	24.9	56	59.1	12.8	35.9	39.4
	Median	0.2	0.7	0	—	—	—	—	17.8	8.9	93	429	8.3	25	52	55.5	12.2	46.4	43.5
	Minimum	0.2	0.3	0	—	—	—	—	12.5	4.4	41	399	7.6	11	15	11.6	4	11.1	8.43
	Maximum	0.2	5	0	—	—	—	—	23.5	15.8	176	687	9.1	45	160	223	34.6	50	98.9
	Std. dev.	0	0.94	0	—	—	—	—	2.45	2.13	25.4	63.6	0.33	7.62	29.5	38.6	6.7	21.5	24
	N obs.	29	29	29	0	0	0	0	29	29	29	29	29	28	29	29	29	3	29
5. Impounded	Mean	0.2	2.33	0	—	—	—	—	18.5	10	108	424	8.3	32.3	26	29.6	6.6	16.9	18.2
	Median	0.2	2.5	0	—	—	—	—	19.6	9.5	104	425	8.2	32	23	24.2	5.3	16.9	15
	Minimum	0.2	0.9	0	—	—	—	—	13.7	7.8	75	402	7.8	25	19	14.3	3.6	15.9	9.25
	Maximum	0.2	4.5	0	—	—	—	—	20.8	16.9	189	443	9	38	37	87.2	19.9	17.8	51.5
	Std. dev.	0	1.33	0	—	—	—	—	2.21	2.49	30.7	14.3	0.32	4.01	5.97	17.3	3.96	1.34	10.9
	N obs.	15	15	15	0	0	0	0	15	15	15	15	15	15	15	15	15	2	15

Table F-2. Summaries of chemical measurements during each stratified random sampling episode from 1993 through 1996. Data are grouped into three sampling-depth categories: near surface (less than 0.2 m below the surface), middepth, and near bottom (less than 0.2 m above the substrate).

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1993 Near-surface measurements: fall													
1. Main channel	Mean	3.924	0.05	2.684	0.223	0.068	—	—	—	—	—	—	—
	Median	3.89	0.048	2.568	0.211	0.063	—	—	—	—	—	—	—
	Minimum	3.212	-0.02	2.238	0.16	0.023	—	—	—	—	—	—	—
	Maximum	5.079	0.104	3.596	0.323	0.135	—	—	—	—	—	—	—
	Std. dev.	0.52	0.029	0.406	0.053	0.035	—	—	—	—	—	—	—
	N obs.	11	11	11	11	11	0	0	0	0	0	0	0
2. Side channel	Mean	4.009	0.05	2.553	0.228	0.055	—	—	—	—	—	—	—
	Median	3.946	0.047	2.414	0.213	0.045	—	—	—	—	—	—	—
	Minimum	3.023	-0.02	1.302	0.143	-0.01	—	—	—	—	—	—	—
	Maximum	4.904	0.101	3.681	0.343	0.142	—	—	—	—	—	—	—
	Std. dev.	0.376	0.033	0.567	0.046	0.043	—	—	—	—	—	—	—
	N obs.	20	21	21	20	21	0	0	0	0	0	0	0
3. Backwater	Mean	2.944	0.193	0.767	0.201	0.035	—	—	—	—	—	—	—
	Median	2.68	0.059	0.511	0.205	0.034	—	—	—	—	—	—	—
	Minimum	1.91	-0.02	-0.01	0.112	-0.01	—	—	—	—	—	—	—
	Maximum	4.935	0.524	2.416	0.285	0.062	—	—	—	—	—	—	—
	Std. dev.	1.028	0.196	0.818	0.048	0.018	—	—	—	—	—	—	—
	N obs.	9	10	10	9	10	0	0	0	0	0	0	0
4. Lake	Mean	3.137	0.035	1.398	0.242	0.046	—	—	—	—	—	—	—
	Median	2.809	-0.02	1.183	0.235	0.045	—	—	—	—	—	—	—
	Minimum	2.256	-0.02	0.785	0.152	0.023	—	—	—	—	—	—	—
	Maximum	4.079	0.101	2.134	0.401	0.07	—	—	—	—	—	—	—
	Std. dev.	0.704	0.034	0.515	0.074	0.017	—	—	—	—	—	—	—
	N obs.	8	8	8	8	8	0	0	0	0	0	0	0
5. Impounded	Mean	3.121	0.061	1.808	0.163	0.048	—	—	—	—	—	—	—
	Median	3.049	0.058	1.605	0.158	0.05	—	—	—	—	—	—	—
	Minimum	2.445	0.025	1.409	0.142	0.032	—	—	—	—	—	—	—
	Maximum	4.129	0.094	2.25	0.191	0.064	—	—	—	—	—	—	—
	Std. dev.	0.505	0.031	0.329	0.02	0.011	—	—	—	—	—	—	—
	N obs.	8	8	8	8	8	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1994 Near-surface measurements: winter							
1. Main channel	Mean	4.528	0.225	3.247	0.138	0.084	—	—	—	—	—	—	—
	Median	3.872	0.196	3.214	0.124	0.075	—	—	—	—	—	—	—
	Minimum	3.104	0.173	2.903	0.108	0.064	—	—	—	—	—	—	—
	Maximum	9.192	0.33	3.822	0.235	0.143	—	—	—	—	—	—	—
	Std. dev.	1.793	0.057	0.238	0.038	0.025	—	—	—	—	—	—	—
	N obs.	10	10	10	10	10	0	0	0	0	0	0	0
2. Side channel	Mean	4.153	0.189	3.272	0.141	0.079	—	—	—	—	—	—	—
	Median	3.696	0.196	3.284	0.131	0.075	—	—	—	—	—	—	—
	Minimum	3.279	-0.02	2.551	0.112	0.015	—	—	—	—	—	—	—
	Maximum	6.391	0.386	4.06	0.253	0.18	—	—	—	—	—	—	—
	Std. dev.	0.879	0.091	0.358	0.038	0.037	—	—	—	—	—	—	—
	N obs.	13	13	13	13	13	0	0	0	0	0	0	0
3. Backwater	Mean	1.609	0.039	0.248	0.151	0.009	—	—	—	—	—	—	—
	Median	1.339	-0.02	0.153	0.085	-0.01	—	—	—	—	—	—	—
	Minimum	0.262	-0.02	-0.01	0.063	-0.01	—	—	—	—	—	—	—
	Maximum	2.955	0.087	0.53	0.302	0.016	—	—	—	—	—	—	—
	Std. dev.	1.175	0.033	0.228	0.099	0.005	—	—	—	—	—	—	—
	N obs.	6	6	6	6	6	0	0	0	0	0	0	0
5. Impounded	Mean	3.201	0.166	2.612	0.124	0.056	—	—	—	—	—	—	—
	Median	2.854	0.164	2.046	0.129	0.056	—	—	—	—	—	—	—
	Minimum	2.579	0.118	2.007	0.106	0.015	—	—	—	—	—	—	—
	Maximum	3.865	0.204	3.201	0.131	0.081	—	—	—	—	—	—	—
	Std. dev.	0.589	0.036	0.676	0.012	0.029	—	—	—	—	—	—	—
	N obs.	4	4	4	4	4	0	0	0	0	0	0	0
						1994 Near-surface measurements: spring							
1. Main channel	Mean	2.562	0.05	1.196	0.319	0.008	0.531	—	—	—	—	13.24	38.28
	Median	2.237	0.055	0.882	0.301	-0.01	0.297	—	—	—	—	11.71	38.45
	Minimum	1.986	-0.02	0.712	0.236	-0.01	-0.05	—	—	—	—	10.38	32.11
	Maximum	5.081	0.096	4.33	0.47	0.013	2.66	—	—	—	—	27.12	43.37
	Std. dev.	0.908	0.027	1.048	0.069	0.004	0.783	—	—	—	—	4.756	3.682
	N obs.	11	11	11	11	11	11	0	0	0	0	11	11

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1994 Near-surface measurements: spring													
2. Side channel	Mean	2.794	0.05	1.319	0.323	0.01	0.751	—	—	—	—	12.48	33.97
	Median	2.426	0.048	0.861	0.299	-0.01	0.367	—	—	—	—	11.64	35.47
	Minimum	2.003	-0.02	0.639	0.204	-0.01	-0.05	—	—	—	—	3.741	17.11
	Maximum	5.037	0.143	4.688	0.464	0.033	4.31	—	—	—	—	24.16	44.98
	Std. dev.	0.917	0.03	1.098	0.07	0.007	1.057	—	—	—	—	5.135	7.73
	N obs.	22	22	22	22	22	22	0	0	0	0	22	22
3. Backwater	Mean	2.593	0.088	1.051	0.353	0.008	1.831	—	—	—	—	11.1	23.77
	Median	2.304	0.047	0.969	0.278	-0.01	1.934	—	—	—	—	8.119	26.19
	Minimum	1.358	-0.02	0.137	0.19	-0.01	0.087	—	—	—	—	4.077	11.86
	Maximum	4.328	0.231	2.654	0.972	0.032	3.099	—	—	—	—	37.5	33.23
	Std. dev.	0.892	0.087	0.599	0.19	0.007	0.818	—	—	—	—	8.164	6.947
	N obs.	15	15	15	15	15	15	0	0	0	0	15	15
4. Lake	Mean	3.814	0.03	3.02	0.281	0.016	2.32	—	—	—	—	17.42	31.92
	Median	3.655	-0.02	2.926	0.27	0.013	2.455	—	—	—	—	18.22	33.6
	Minimum	3.292	-0.02	2.339	0.23	-0.01	0.773	—	—	—	—	9.895	23.11
	Maximum	4.399	0.112	3.898	0.326	0.034	3.094	—	—	—	—	21.73	43.24
	Std. dev.	0.455	0.036	0.518	0.039	0.013	0.77	—	—	—	—	3.848	7.182
	N obs.	8	8	8	8	7	7	0	0	0	0	7	7
5. Impounded	Mean	2.765	0.229	0.937	0.298	0.015	1.677	—	—	—	—	9.479	24.87
	Median	2.256	0.1	0.899	0.265	0.012	1.099	—	—	—	—	8.546	22.62
	Minimum	1.993	0.082	0.877	0.199	-0.01	0.881	—	—	—	—	7.106	17.07
	Maximum	5.934	0.612	1.016	0.418	0.039	2.978	—	—	—	—	15.03	31.84
	Std. dev.	1.306	0.204	0.06	0.072	0.011	0.887	—	—	—	—	2.519	5.632
	N obs.	8	8	8	8	8	8	0	0	0	0	8	8
1994 Near-surface measurements: summer													
1. Main channel	Mean	3.407	0.017	1.939	0.089	0.02	4.114	—	—	—	—	14.71	35.3
	Median	3.381	-0.02	2.095	0.06	0.014	4.299	—	—	—	—	12.77	35.7
	Minimum	2.743	-0.02	1.039	0.044	-0.01	1.652	—	—	—	—	8.7	24.32
	Maximum	4.444	0.04	2.654	0.16	0.073	5.703	—	—	—	—	23.22	44.2
	Std. dev.	0.514	0.012	0.554	0.048	0.02	1.123	—	—	—	—	4.773	6.351
	N obs.	11	11	11	11	11	11	0	0	0	0	11	11

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
1994 Near-surface measurements: summer													
2. Side channel	Mean	3.506	0.015	1.993	0.094	0.023	4.295	—	—	—	—	13.01	33.33
	Median	3.66	-0.02	2.246	0.072	0.018	4.537	—	—	—	—	13.07	36.6
	Minimum	1.899	-0.02	-0.01	0.037	-0.01	-0.05	—	—	—	—	8.563	0
	Maximum	4.324	0.039	2.775	0.16	0.099	5.724	—	—	—	—	22.74	44.69
	Std. dev.	0.622	0.008	0.755	0.043	0.021	1.21	—	—	—	—	3.112	8.833
	N obs.	21	21	21	21	21	21	0	0	0	0	21	21
3. Backwater	Mean	2.752	0.027	0.521	0.094	0.012	1.662	—	—	—	—	14.22	35.64
	Median	1.916	-0.02	0.142	0.095	-0.01	1.236	—	—	—	—	14.52	38.69
	Minimum	0.951	-0.02	-0.01	0.036	-0.01	0.321	—	—	—	—	5.83	14.91
	Maximum	12.3	0.23	2.617	0.154	0.056	3.749	—	—	—	—	25.87	45.82
	Std. dev.	2.609	0.053	0.818	0.039	0.015	1.222	—	—	—	—	4.699	8.023
	N obs.	17	17	17	17	17	17	0	0	0	0	17	17
5. Impounded	Mean	3.397	0.027	1.946	0.06	0.009	4.002	—	—	—	—	11.78	34.28
	Median	3.183	-0.02	1.691	0.041	-0.01	3.893	—	—	—	—	12.95	37.17
	Minimum	2.247	-0.02	1.338	0.028	-0.01	2.789	—	—	—	—	6.116	18.22
	Maximum	4.275	0.086	2.609	0.143	0.03	5.682	—	—	—	—	13.89	40.99
	Std. dev.	0.74	0.027	0.459	0.038	0.009	0.969	—	—	—	—	2.706	7.651
	N obs.	8	8	8	8	8	8	0	0	0	0	8	8
1994 Near-surface measurements: fall													
1. Main channel	Mean	2.33	0.013	1.736	0.145	0.036	5.214	—	—	—	—	14.73	30.08
	Median	2.343	-0.02	1.71	0.139	0.035	5.213	—	—	—	—	14.14	29.74
	Minimum	1.339	-0.02	1.627	0.119	0.016	4.553	—	—	—	—	10.94	25.18
	Maximum	2.957	0.04	1.881	0.194	0.054	5.751	—	—	—	—	25.52	41.07
	Std. dev.	0.394	0.009	0.093	0.027	0.012	0.322	—	—	—	—	3.836	4.245
	N obs.	11	11	11	11	11	11	0	0	0	0	11	11
2. Side channel	Mean	2.377	0.019	1.767	0.149	0.036	5.115	—	—	—	—	15.97	30.6
	Median	2.33	-0.02	1.739	0.139	0.03	5.203	—	—	—	—	14.63	29.67
	Minimum	1.961	-0.02	1.625	0.114	-0.01	3.722	—	—	—	—	9.346	19.99
	Maximum	2.957	0.106	1.996	0.2	0.1	5.751	—	—	—	—	26.41	41.66
	Std. dev.	0.252	0.022	0.1	0.024	0.025	0.465	—	—	—	—	4.735	5.571
	N obs.	21	22	22	21	21	21	0	0	0	0	21	21

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1994 Near-surface measurements: fall							
3. Backwater	Mean	1.594	0.021	0.341	0.187	0.032	3.59	—	—	—	—	13.23	35.19
	Median	1.471	-0.02	0.293	0.2	0.013	3.53	—	—	—	—	13.77	33.4
	Minimum	0.989	-0.02	-0.01	0.085	-0.01	1.376	—	—	—	—	8.558	23.34
	Maximum	2.217	0.116	0.951	0.373	0.267	5.725	—	—	—	—	17.48	55.82
	Std. dev.	0.385	0.028	0.299	0.075	0.064	1.404	—	—	—	—	2.463	8.537
	N obs.	15	15	15	15	16	16	0	0	0	0	16	16
4. Lake	Mean	1.63	0.022	0.289	0.26	0.023	3.153	—	—	—	—	42.52	60.48
	Median	1.64	-0.02	-0.01	0.253	0.022	3.26	—	—	—	—	44.86	64.18
	Minimum	0.827	-0.02	-0.01	0.145	-0.01	1.442	—	—	—	—	13.85	30.86
	Maximum	2.518	0.06	1.871	0.329	0.053	5.426	—	—	—	—	59.31	79.99
	Std. dev.	0.512	0.017	0.643	0.065	0.016	1.171	—	—	—	—	11.94	13.01
	N obs.	8	8	8	8	9	9	0	0	0	0	9	9
5. Impounded	Mean	1.788	0.02	1.237	0.113	0.012	4.036	—	—	—	—	13.27	28.65
	Median	1.766	-0.02	1.025	0.109	-0.01	4.036	—	—	—	—	12.93	28.01
	Minimum	1.184	-0.02	0.474	0.091	-0.01	1.925	—	—	—	—	10.49	23.79
	Maximum	2.28	0.043	1.815	0.134	0.023	5.192	—	—	—	—	15.95	31.78
	Std. dev.	0.388	0.012	0.485	0.016	0.007	1.098	—	—	—	—	1.738	2.662
	N obs.	8	8	8	8	8	8	0	0	0	0	8	8
						1995 Near-surface measurements: winter							
1. Main channel	Mean	4.276	0.057	3.104	0.171	0.021	4.656	—	—	—	—	19.28	26.3
	Median	3.989	0.06	3.024	0.13	0.016	4.6	—	—	—	—	17.1	26.5
	Minimum	2.889	-0.02	2.192	0.092	-0.01	4.3	—	—	—	—	10.02	13.45
	Maximum	6.013	0.123	4.758	0.346	0.057	5.011	—	—	—	—	40.14	43.77
	Std. dev.	1.003	0.04	0.622	0.08	0.017	0.219	—	—	—	—	9.345	9.954
	N obs.	10	11	11	10	11	11	0	0	0	0	11	11
2. Side channel	Mean	3.485	0.064	2.558	0.161	0.024	3.84	—	—	—	—	18.74	27.29
	Median	3.536	0.043	2.664	0.14	0.014	4.204	—	—	—	—	19.51	30.3
	Minimum	1.336	-0.02	0.226	0.046	-0.01	0.568	—	—	—	—	4.296	8.127
	Maximum	6.026	0.193	5.353	0.374	0.115	5.098	—	—	—	—	47.91	50.02
	Std. dev.	1.335	0.056	1.298	0.089	0.032	1.308	—	—	—	—	9.492	10.63
	N obs.	21	21	21	21	21	21	0	0	0	0	21	21

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1995 Near-surface measurements: winter							
3. Backwater	Mean	1.903	0.046	1.029	0.129	0.012	2.027	—	—	—	—	13.36	24.27
	Median	1.498	-0.02	0.607	0.118	-0.01	1.451	—	—	—	—	12.95	24.72
	Minimum	0.896	-0.02	-0.01	0.039	-0.01	-0.05	—	—	—	—	5.151	10.89
	Maximum	3.775	0.169	2.76	0.337	0.03	5.363	—	—	—	—	21.81	34.09
	Std. dev.	1.004	0.052	0.96	0.076	0.009	1.93	—	—	—	—	5.592	7.116
	N obs.	13	12	12	13	13	13	0	0	0	0	13	13
5. Impounded	Mean	4.692	0.058	2.635	0.107	0.021	3.784	—	—	—	—	19.25	28.13
	Median	3.313	0.05	2.635	0.083	0.012	3.621	—	—	—	—	18.58	26.88
	Minimum	3.115	0.03	2.4	0.08	-0.01	3.132	—	—	—	—	14.4	19.6
	Maximum	12.83	0.092	2.887	0.167	0.062	4.355	—	—	—	—	24.27	36.19
	Std. dev.	3.338	0.022	0.157	0.031	0.022	0.43	—	—	—	—	3.052	5.06
	N obs.	8	8	8	8	8	8	0	0	0	0	8	8
						1995 Near-surface measurements: spring							
1. Main channel	Mean	6.437	0.07	4.771	0.207	0.014	4.629	—	—	—	—	15.13	34.24
	Median	6.241	0.068	4.861	0.209	0.013	4.583	—	—	—	—	14.79	33.67
	Minimum	5.163	0.046	4.3	0.143	-0.01	3.78	—	—	—	—	14.16	31.42
	Maximum	8.736	0.114	5.047	0.257	0.027	5.161	—	—	—	—	17.49	35.96
	Std. dev.	1.061	0.019	0.241	0.033	0.007	0.423	—	—	—	—	1.091	1.575
	N obs.	11	11	11	11	11	8	0	0	0	0	8	8
2. Side channel	Mean	6.729	0.072	4.869	0.206	0.028	4.494	—	—	—	—	17.51	34.59
	Median	6.429	0.068	4.843	0.204	0.014	4.742	—	—	—	—	14.9	33.68
	Minimum	4.795	0.042	4.205	0.159	-0.01	3.271	—	—	—	—	11.99	26
	Maximum	13.06	0.129	5.358	0.312	0.24	5.001	—	—	—	—	35.01	46.45
	Std. dev.	1.775	0.022	0.287	0.031	0.051	0.588	—	—	—	—	7.361	5.345
	N obs.	22	22	22	22	22	14	0	0	0	0	14	14
3. Backwater	Mean	4.463	0.07	2.435	0.183	0.011	2.176	—	—	—	—	17.7	32.28
	Median	4.292	0.048	1.665	0.153	-0.01	0.854	—	—	—	—	14.34	28.72
	Minimum	2.347	0.027	-0.01	0.074	-0.01	-0.05	—	—	—	—	11.06	17.07
	Maximum	8.756	0.199	5.137	0.42	0.034	4.787	—	—	—	—	37.98	55.64
	Std. dev.	1.662	0.051	2.051	0.087	0.009	2.206	—	—	—	—	8.057	12.02
	N obs.	18	18	18	18	18	12	0	0	0	0	12	12

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1995 Near-surface measurements: spring							
4. Lake	Mean	4.262	0.04	1.636	0.163	0.007	-0.05	—	—	—	—	41.14	54.17
	Median	3.225	0.045	1.229	0.16	-0.01	-0.05	—	—	—	—	41.14	53.77
	Minimum	2.607	-0.02	0.741	0.109	-0.01	-0.05	—	—	—	—	41.01	53.53
	Maximum	6.04	0.049	3.641	0.194	0.022	-0.05	—	—	—	—	41.26	55.22
	Std. dev.	1.512	0.014	1.006	0.028	0.006	0	—	—	—	—	0.123	0.916
	N obs.	8	8	8	8	8	3	0	0	0	0	3	3
5. Impounded	Mean	5.132	0.069	3.303	0.151	0.009	2.117	—	—	—	—	13.6	27.09
	Median	4.452	0.086	2.856	0.146	-0.01	1.688	—	—	—	—	14.16	25.9
	Minimum	3.676	0.032	2.542	0.107	-0.01	1.366	—	—	—	—	10.33	20.43
	Maximum	7.389	0.099	4.164	0.219	0.023	3.993	—	—	—	—	14.67	34.46
	Std. dev.	1.412	0.028	0.701	0.037	0.006	0.961	—	—	—	—	1.644	4.711
	N obs.	9	9	9	9	9	6	0	0	0	0	6	6
						1995 Near-surface measurements: summer							
1. Main channel	Mean	3.967	0.028	2.716	0.17	0.022	—	—	—	—	—	—	—
	Median	4.067	0.025	2.911	0.16	0.02	—	—	—	—	—	—	—
	Minimum	3.105	-0.02	-0.01	0.137	0.015	—	—	—	—	—	—	—
	Maximum	4.532	0.067	3.481	0.213	0.036	—	—	—	—	—	—	—
	Std. dev.	0.472	0.016	1.01	0.024	0.007	—	—	—	—	—	—	—
	N obs.	12	12	12	12	12	0	0	0	0	0	0	0
2. Side channel	Mean	3.826	0.031	2.684	0.193	0.029	—	—	—	—	—	—	—
	Median	4.021	0.033	2.743	0.18	0.029	—	—	—	—	—	—	—
	Minimum	2.482	-0.02	1.669	0.129	0.01	—	—	—	—	—	—	—
	Maximum	5.315	0.05	3.478	0.33	0.05	—	—	—	—	—	—	—
	Std. dev.	0.675	0.01	0.684	0.048	0.011	—	—	—	—	—	—	—
	N obs.	21	21	21	21	21	0	0	0	0	0	0	0
3. Backwater	Mean	2.876	0.103	0.446	0.382	0.012	—	—	—	—	—	—	—
	Median	3.031	0.053	0.073	0.32	0.011	—	—	—	—	—	—	—
	Minimum	2.069	0.02	-0.01	0.148	-0.01	—	—	—	—	—	—	—
	Maximum	3.67	0.298	2.036	0.69	0.03	—	—	—	—	—	—	—
	Std. dev.	0.499	0.088	0.647	0.159	0.007	—	—	—	—	—	—	—
	N obs.	17	17	17	17	17	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1995 Near-surface measurements: summer							
4. Lake	Mean	2.834	0.051	0.364	0.67	0.071	—	—	—	—	—	—	—
	Median	2.587	0.021	-0.01	0.67	0.061	—	—	—	—	—	—	—
	Minimum	2.302	-0.02	-0.01	0.31	0.018	—	—	—	—	—	—	—
	Maximum	3.451	0.205	1.71	0.86	0.125	—	—	—	—	—	—	—
	Std. dev.	0.435	0.066	0.679	0.181	0.044	—	—	—	—	—	—	—
	N obs.	8	8	8	8	8	0	0	0	0	0	0	0
5. Impounded	Mean	3.417	0.034	2.134	0.198	0.014	—	—	—	—	—	—	—
	Median	3.205	0.035	1.849	0.17	-0.01	—	—	—	—	—	—	—
	Minimum	2.806	-0.02	1.484	0.077	-0.01	—	—	—	—	—	—	—
	Maximum	4.495	0.054	3.369	0.64	0.05	—	—	—	—	—	—	—
	Std. dev.	0.538	0.012	0.645	0.173	0.016	—	—	—	—	—	—	—
	N obs.	9	9	9	9	9	0	0	0	0	0	0	0
						1995 Near-surface measurements: fall							
1. Main channel	Mean	1.839	0.048	0.921	0.138	0.048	—	—	—	—	—	—	—
	Median	1.836	0.046	0.899	0.134	0.05	—	—	—	—	—	—	—
	Minimum	1.61	0.021	0.776	0.082	0.036	—	—	—	—	—	—	—
	Maximum	2.088	0.071	1.028	0.184	0.057	—	—	—	—	—	—	—
	Std. dev.	0.143	0.017	0.07	0.027	0.007	—	—	—	—	—	—	—
	N obs.	12	12	12	12	12	0	0	0	0	0	0	0
2. Side channel	Mean	2.003	0.059	1.006	0.153	0.055	—	—	—	—	—	—	—
	Median	2.003	0.056	0.975	0.147	0.054	—	—	—	—	—	—	—
	Minimum	1.663	0.024	0.775	0.1	0.035	—	—	—	—	—	—	—
	Maximum	2.526	0.117	1.231	0.266	0.076	—	—	—	—	—	—	—
	Std. dev.	0.264	0.028	0.167	0.034	0.013	—	—	—	—	—	—	—
	N obs.	21	21	21	21	21	0	0	0	0	0	0	0
3. Backwater	Mean	1.719	0.051	0.096	0.254	0.015	—	—	—	—	—	—	—
	Median	1.66	0.04	0.039	0.201	0.016	—	—	—	—	—	—	—
	Minimum	1.265	0.025	-0.01	0.122	-0.01	—	—	—	—	—	—	—
	Maximum	2.67	0.136	0.325	0.62	0.029	—	—	—	—	—	—	—
	Std. dev.	0.317	0.026	0.112	0.137	0.008	—	—	—	—	—	—	—
	N obs.	17	17	17	17	17	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1995 Near-surface measurements: fall							
4. Lake	Mean	2.588	0.036	0.105	0.363	0.014	—	—	—	—	—	—	—
	Median	2.514	0.034	-0.01	0.315	0.011	—	—	—	—	—	—	—
	Minimum	2.02	0.024	-0.01	0.239	-0.01	—	—	—	—	—	—	—
	Maximum	3.351	0.049	0.66	0.52	0.028	—	—	—	—	—	—	—
	Std. dev.	0.417	0.008	0.23	0.102	0.009	—	—	—	—	—	—	—
	N obs.	8	8	8	8	8	0	0	0	0	0	0	0
5. Impounded	Mean	1.69	0.049	0.691	0.154	0.035	—	—	—	—	—	—	—
	Median	1.687	0.049	0.69	0.12	0.038	—	—	—	—	—	—	—
	Minimum	1.52	0.029	0.569	0.093	0.022	—	—	—	—	—	—	—
	Maximum	1.815	0.069	0.874	0.404	0.051	—	—	—	—	—	—	—
	Std. dev.	0.107	0.014	0.098	0.097	0.011	—	—	—	—	—	—	—
	N obs.	9	9	9	9	9	0	0	0	0	0	0	0
						1996 Near-surface measurements: winter							
1. Main channel	Mean	3.522	0.369	2.424	0.173	0.096	—	—	—	—	—	—	—
	Median	3.436	0.365	2.315	0.185	0.091	—	—	—	—	—	—	—
	Minimum	3.162	0.292	2.136	0.101	0.059	—	—	—	—	—	—	—
	Maximum	4.119	0.468	2.893	0.234	0.147	—	—	—	—	—	—	—
	Std. dev.	0.288	0.047	0.27	0.047	0.028	—	—	—	—	—	—	—
	N obs.	11	11	11	11	11	0	0	0	0	0	0	0
2. Side channel	Mean	3.56	0.319	2.399	0.152	0.087	—	—	—	—	—	—	—
	Median	3.406	0.343	2.239	0.166	0.084	—	—	—	—	—	—	—
	Minimum	1.85	0.059	0.445	0.056	-0.01	—	—	—	—	—	—	—
	Maximum	4.305	0.436	3.165	0.21	0.174	—	—	—	—	—	—	—
	Std. dev.	0.556	0.082	0.606	0.041	0.039	—	—	—	—	—	—	—
	N obs.	20	20	20	20	20	0	0	0	0	0	0	0
3. Backwater	Mean	2.203	0.107	0.773	0.13	0.047	—	—	—	—	—	—	—
	Median	2.264	0.055	0.599	0.103	0.018	—	—	—	—	—	—	—
	Minimum	1.046	0.028	-0.01	0.02	-0.01	—	—	—	—	—	—	—
	Maximum	3.938	0.325	3.179	0.465	0.44	—	—	—	—	—	—	—
	Std. dev.	0.902	0.1	0.991	0.105	0.099	—	—	—	—	—	—	—
	N obs.	19	19	19	19	19	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1996 Near-surface measurements: winter							
5. Impounded	Mean	3.723	0.21	2.477	0.09	0.043	—	—	—	—	—	—	—
	Median	3.491	0.199	2.457	0.102	0.044	—	—	—	—	—	—	—
	Minimum	3.231	0.182	2.253	0.04	0.025	—	—	—	—	—	—	—
	Maximum	4.644	0.252	2.684	0.112	0.061	—	—	—	—	—	—	—
	Std. dev.	0.459	0.024	0.131	0.027	0.012	—	—	—	—	—	—	—
	N obs.	8	8	8	8	8	0	0	0	0	0	0	0
						1996 Near-surface measurements: spring							
1. Main channel	Mean	2.698	—	1.519	0.286	0.064	—	—	—	—	—	—	—
	Median	2.533	—	1.408	0.247	0.058	—	—	—	—	—	—	—
	Minimum	2.244	—	1.206	0.15	0.031	—	—	—	—	—	—	—
	Maximum	3.625	—	2.071	0.567	0.141	—	—	—	—	—	—	—
	Std. dev.	0.422	—	0.254	0.111	0.029	—	—	—	—	—	—	—
	N obs.	12	0	12	12	12	0	0	0	0	0	0	0
2. Side channel	Mean	2.916	—	1.799	0.266	0.056	—	—	—	—	—	—	—
	Median	2.57	—	1.424	0.234	0.047	—	—	—	—	—	—	—
	Minimum	2.211	—	1.202	0.178	0.029	—	—	—	—	—	—	—
	Maximum	6.133	—	8.562	0.463	0.144	—	—	—	—	—	—	—
	Std. dev.	0.912	—	1.538	0.08	0.026	—	—	—	—	—	—	—
	N obs.	22	0	22	22	22	0	0	0	0	0	0	0
3. Backwater	Mean	2.667	—	1.441	0.351	0.052	—	—	—	—	—	—	—
	Median	2.676	—	0.991	0.366	0.048	—	—	—	—	—	—	—
	Minimum	1.035	—	-0.01	0.132	0.023	—	—	—	—	—	—	—
	Maximum	3.68	—	6.957	0.62	0.079	—	—	—	—	—	—	—
	Std. dev.	0.735	—	1.667	0.153	0.017	—	—	—	—	—	—	—
	N obs.	16	0	16	16	16	0	0	0	0	0	0	0
4. Lake	Mean	3.566	—	2.792	0.365	0.1	—	—	—	—	—	—	—
	Median	3.153	—	1.824	0.334	0.098	—	—	—	—	—	—	—
	Minimum	2.321	—	0.243	0.195	0.037	—	—	—	—	—	—	—
	Maximum	4.845	—	6.647	0.76	0.202	—	—	—	—	—	—	—
	Std. dev.	1.017	—	2.037	0.172	0.053	—	—	—	—	—	—	—
	N obs.	8	0	8	8	8	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1996 Near-surface measurements: spring							
5. Impounded	Mean	2.469	—	1.782	0.2	0.046	—	—	—	—	—	—	—
	Median	2.297	—	1.398	0.164	0.041	—	—	—	—	—	—	—
	Minimum	2.175	—	1.206	0.126	0.029	—	—	—	—	—	—	—
	Maximum	3.459	—	4.366	0.47	0.079	—	—	—	—	—	—	—
	Std. dev.	0.423	—	1.067	0.111	0.015	—	—	—	—	—	—	—
	N obs.	8	0	8	8	8	0	0	0	0	0	0	0
						1996 Near-surface measurements: summer							
1. Main channel	Mean	4.549	0.01	3.581	0.276	0.056	—	—	—	—	—	—	—
	Median	4.256	-0.02	3.59	0.276	0.068	—	—	—	—	—	—	—
	Minimum	3.854	-0.02	3.102	0.276	0.026	—	—	—	—	—	—	—
	Maximum	7.944	-0.02	4.189	0.276	0.094	—	—	—	—	—	—	—
	Std. dev.	1.161	0	0.353	—	0.025	—	—	—	—	—	—	—
	N obs.	11	11	11	1	11	0	0	0	0	0	0	0
2. Side channel	Mean	4.366	0.011	3.549	0.233	0.052	—	—	—	—	—	—	—
	Median	4.337	-0.02	3.59	0.23	0.057	—	—	—	—	—	—	—
	Minimum	3.789	-0.02	3.048	0.23	0.022	—	—	—	—	—	—	—
	Maximum	6.023	0.024	4.046	0.236	0.085	—	—	—	—	—	—	—
	Std. dev.	0.553	0.004	0.261	0.004	0.019	—	—	—	—	—	—	—
	N obs.	23	23	23	2	23	0	0	0	0	0	0	0
3. Backwater	Mean	3.118	0.155	0.879	—	0.02	—	—	—	—	—	—	—
	Median	3.077	0.067	0.548	—	0.019	—	—	—	—	—	—	—
	Minimum	1.967	-0.02	-0.01	—	-0.01	—	—	—	—	—	—	—
	Maximum	4.416	0.469	3.194	—	0.048	—	—	—	—	—	—	—
	Std. dev.	0.635	0.178	1.045	—	0.013	—	—	—	—	—	—	—
	N obs.	16	16	16	0	16	0	0	0	0	0	0	0
4. Lake	Mean	2.181	0.025	0.257	—	0.049	—	—	—	—	—	—	—
	Median	2.02	-0.02	-0.01	—	0.042	—	—	—	—	—	—	—
	Minimum	1.842	-0.02	-0.01	—	0.014	—	—	—	—	—	—	—
	Maximum	2.845	0.06	0.96	—	0.1	—	—	—	—	—	—	—
	Std. dev.	0.331	0.022	0.411	—	0.033	—	—	—	—	—	—	—
	N obs.	8	8	8	0	8	0	0	0	0	0	0	0

Table F-2. Continued.

Sampling stratum	Statistic	Total nitrogen (N mg/L)	Ammonium (N mg/L)	Nitrate–nitrite (N mg/L)	Total phosphorus (P mg/L)	Soluble reactive P (P mg/L)	Silica (Si mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)
						1996 Near-surface measurements: summer							
5. Impounded	Mean	3.996	0.017	3.041	—	0.023	—	—	—	—	—	—	—
	Median	4.116	-0.02	3.237	—	0.016	—	—	—	—	—	—	—
	Minimum	2.954	-0.02	0.572	—	-0.01	—	—	—	—	—	—	—
	Maximum	4.447	0.039	4.07	—	0.053	—	—	—	—	—	—	—
	Std. dev.	0.494	0.011	1.049	—	0.019	—	—	—	—	—	—	—
	N obs.	8	8	8	0	8	0	0	0	0	0	0	0
						1996 Near-surface measurements: fall							
1. Main channel	Mean	2.097	0.03	0.93	—	0.045	—	—	—	—	—	—	—
	Median	1.724	0.035	0.913	—	0.045	—	—	—	—	—	—	—
	Minimum	1.413	-0.02	0.8	—	0.027	—	—	—	—	—	—	—
	Maximum	4.272	0.043	1.116	—	0.069	—	—	—	—	—	—	—
	Std. dev.	0.927	0.011	0.109	—	0.014	—	—	—	—	—	—	—
	N obs.	11	11	11	0	11	0	0	0	0	0	0	0
2. Side channel	Mean	1.685	0.033	0.914	—	0.034	—	—	—	—	—	—	—
	Median	1.527	0.031	0.838	—	0.029	—	—	—	—	—	—	—
	Minimum	1.303	-0.02	0.61	—	0.014	—	—	—	—	—	—	—
	Maximum	2.294	0.072	1.299	—	0.074	—	—	—	—	—	—	—
	Std. dev.	0.312	0.015	0.178	—	0.015	—	—	—	—	—	—	—
	N obs.	22	22	22	0	22	0	0	0	0	0	0	0
3. Backwater	Mean	1.446	0.028	0.256	—	0.015	—	—	—	—	—	—	—
	Median	1.424	-0.02	0.103	—	-0.01	—	—	—	—	—	—	—
	Minimum	1.038	-0.02	-0.01	—	-0.01	—	—	—	—	—	—	—
	Maximum	2.179	0.111	0.816	—	0.082	—	—	—	—	—	—	—
	Std. dev.	0.344	0.03	0.29	—	0.02	—	—	—	—	—	—	—
	N obs.	15	16	16	0	16	0	0	0	0	0	0	0
5. Impounded	Mean	1.501	0.036	0.704	—	0.02	—	—	—	—	—	—	—
	Median	1.492	0.042	0.69	—	0.017	—	—	—	—	—	—	—
	Minimum	1.39	-0.02	0.609	—	-0.01	—	—	—	—	—	—	—
	Maximum	1.59	0.062	0.829	—	0.038	—	—	—	—	—	—	—
	Std. dev.	0.067	0.023	0.067	—	0.011	—	—	—	—	—	—	—
	N obs.	8	8	8	0	8	0	0	0	0	0	0	0

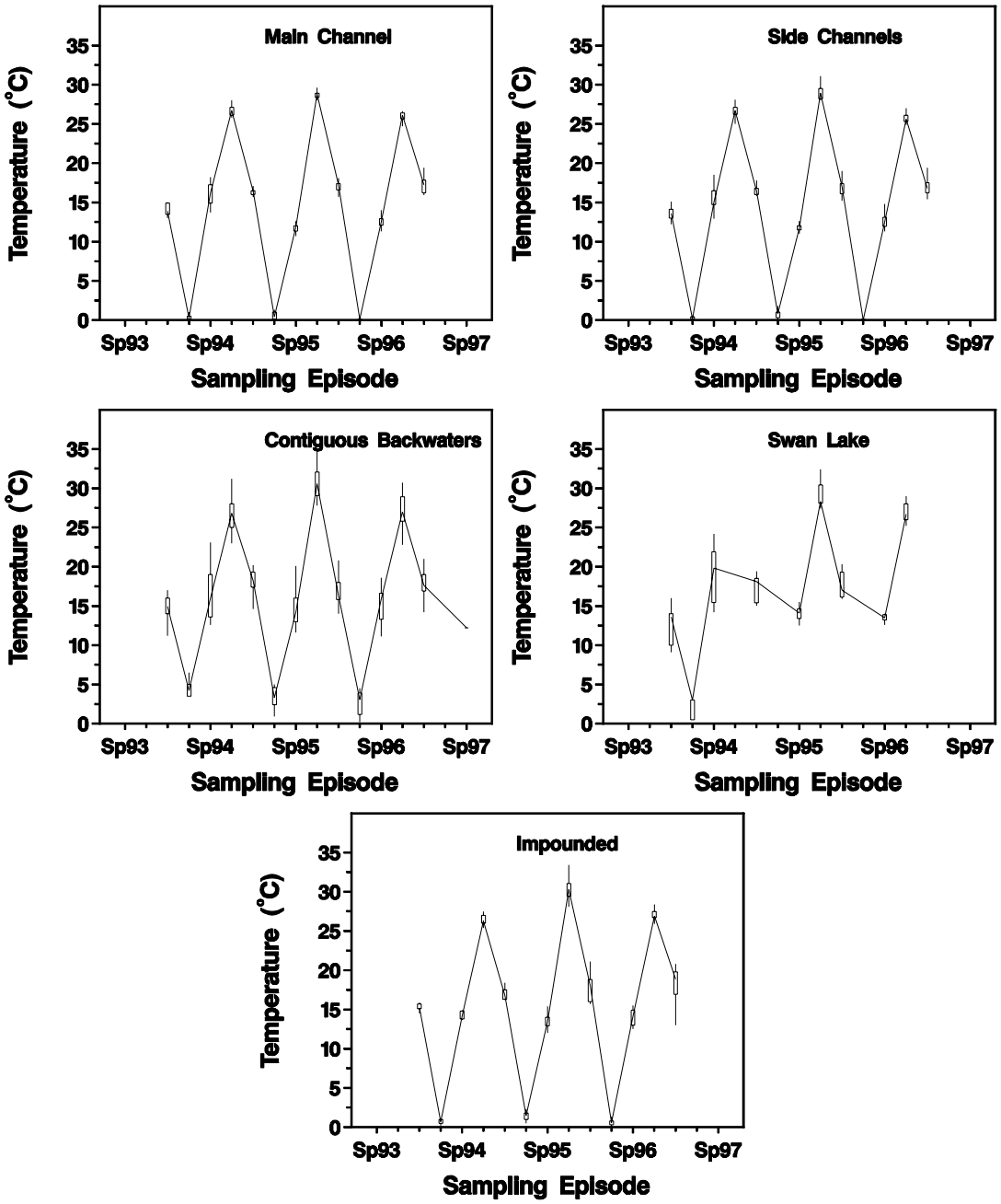

Figure F-1. Water temperature (°C) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

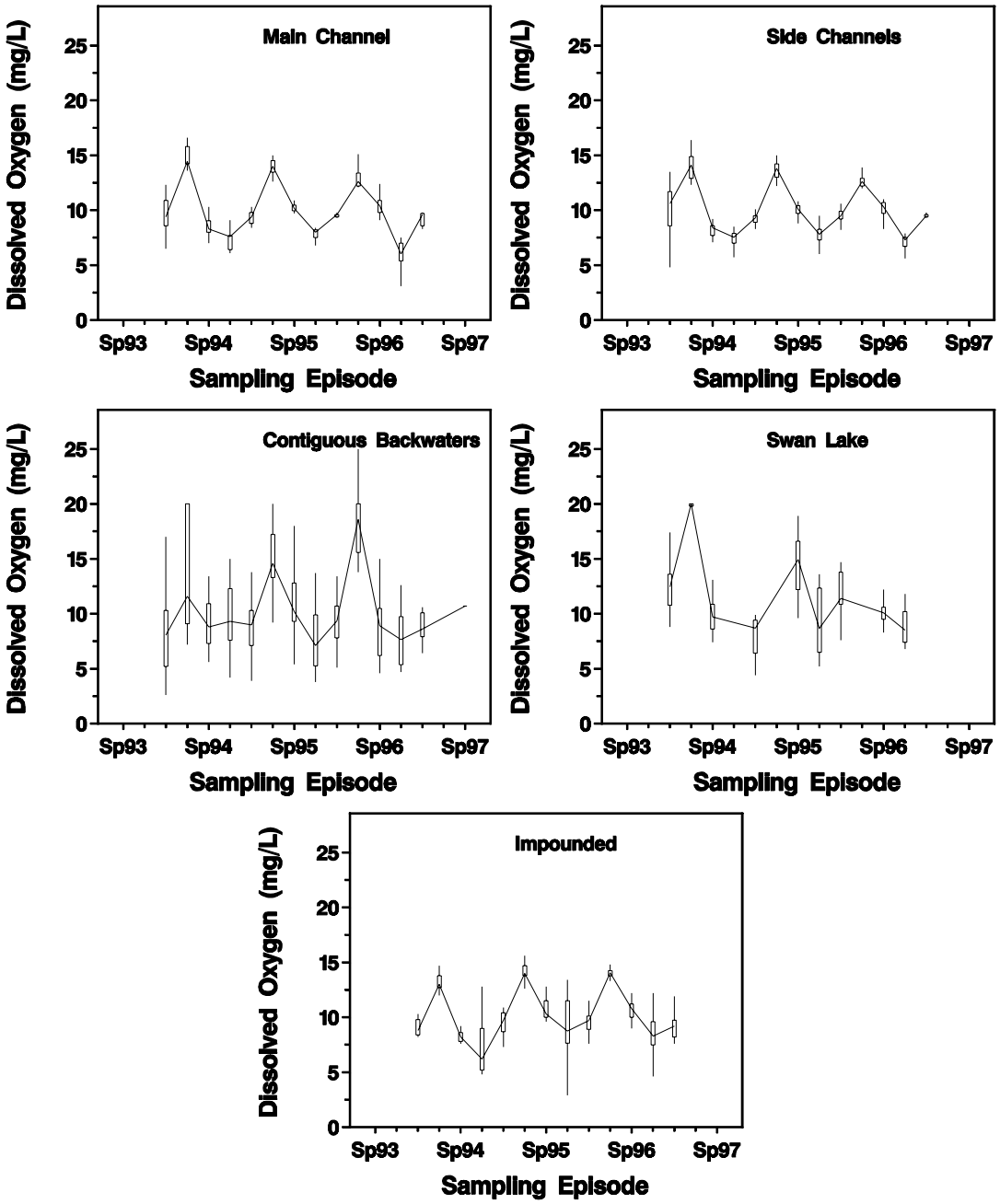

Figure F-2. Dissolved oxygen (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

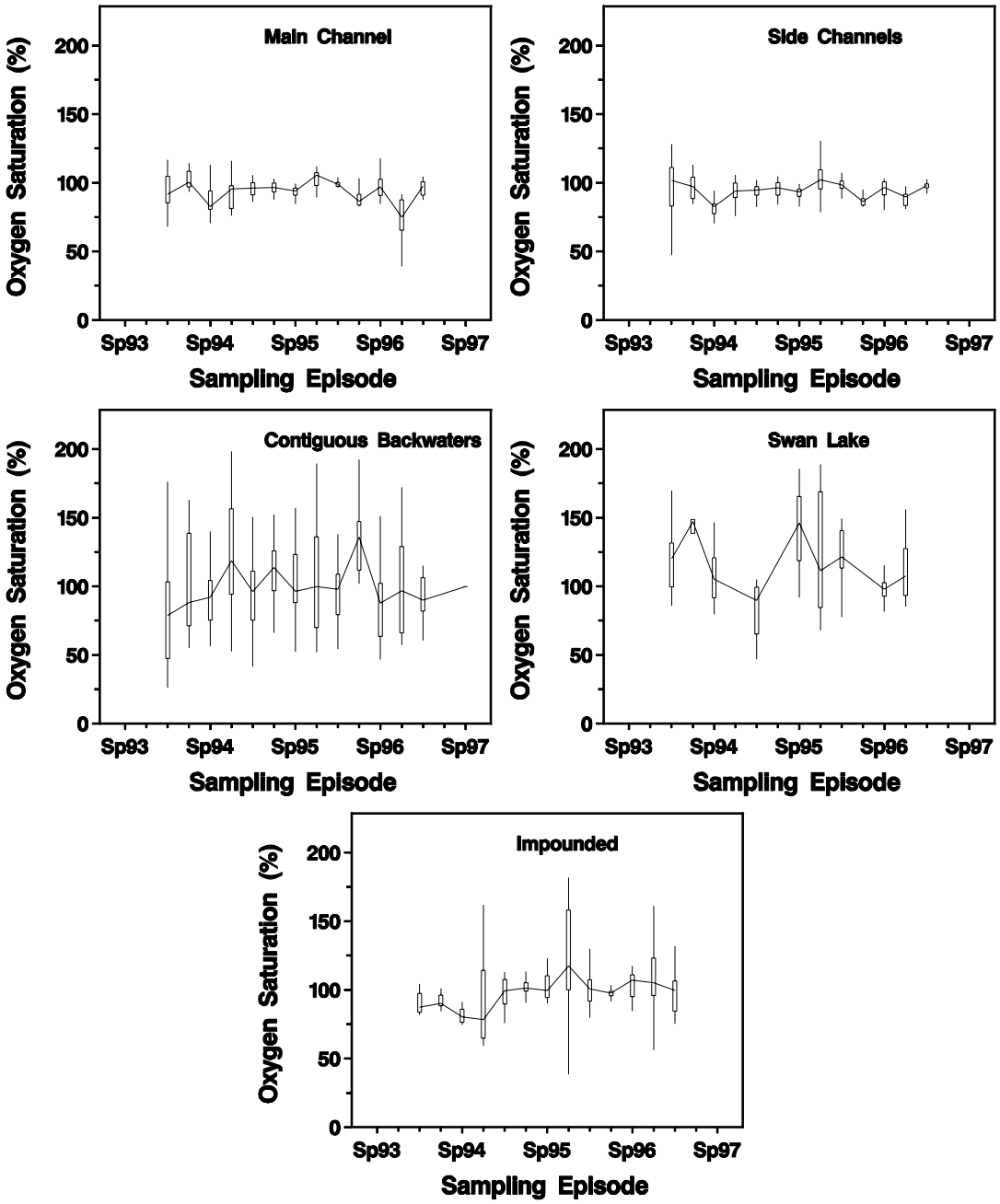

Figure F-3. Dissolved oxygen saturation (%) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

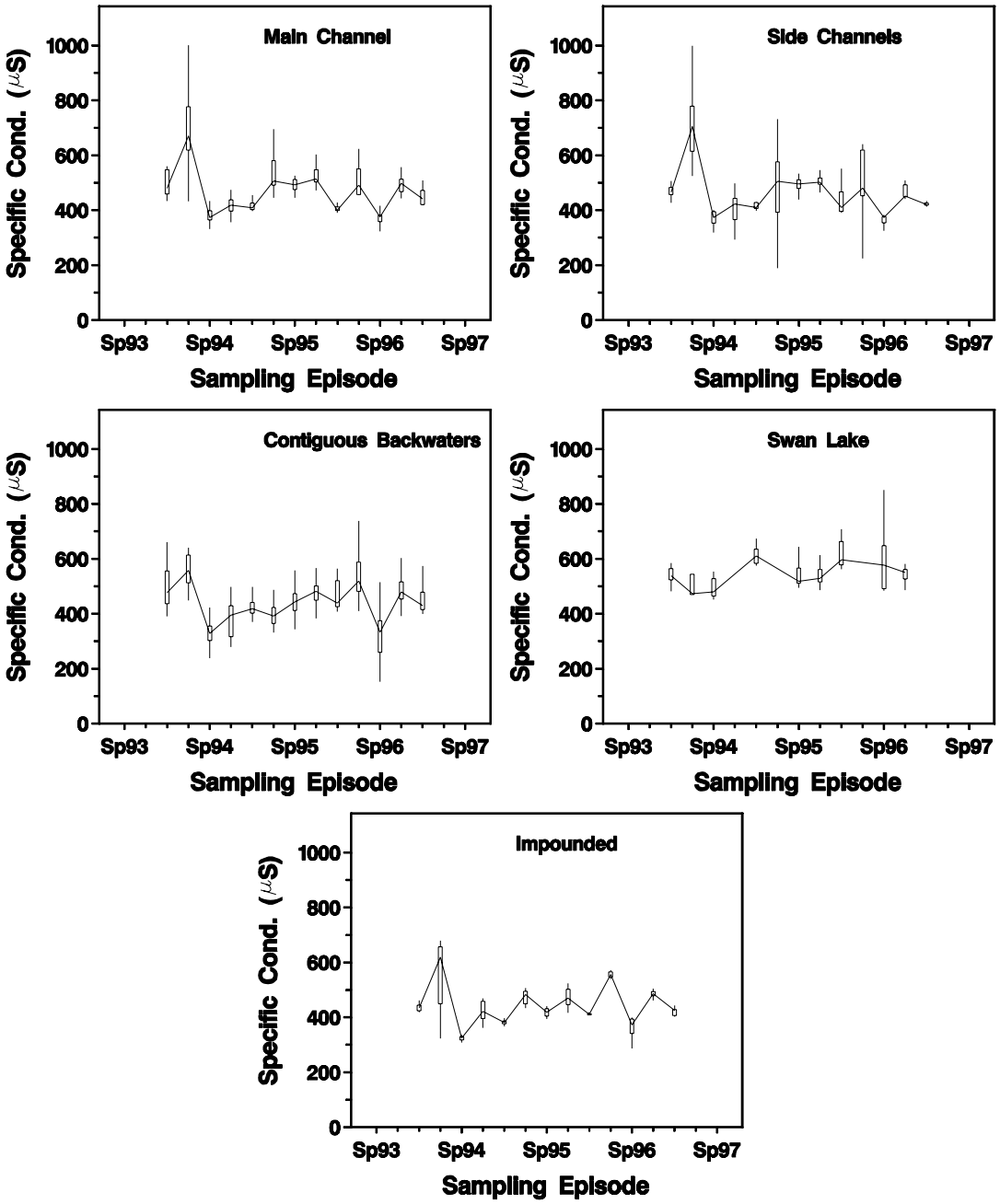

Figure F-4. Specfic conductivity (µS) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

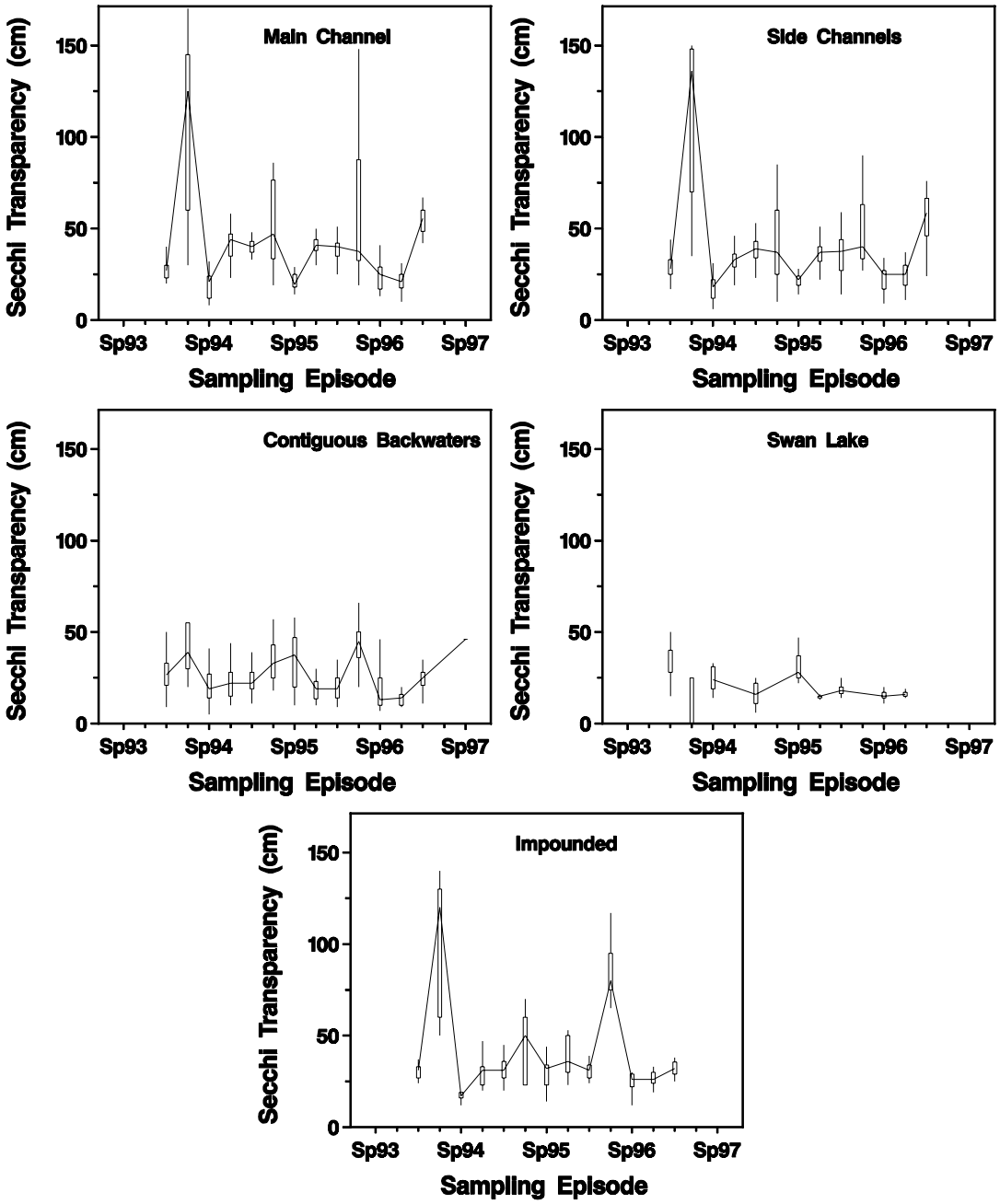

Figure F-5. Secchi transparency (cm) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

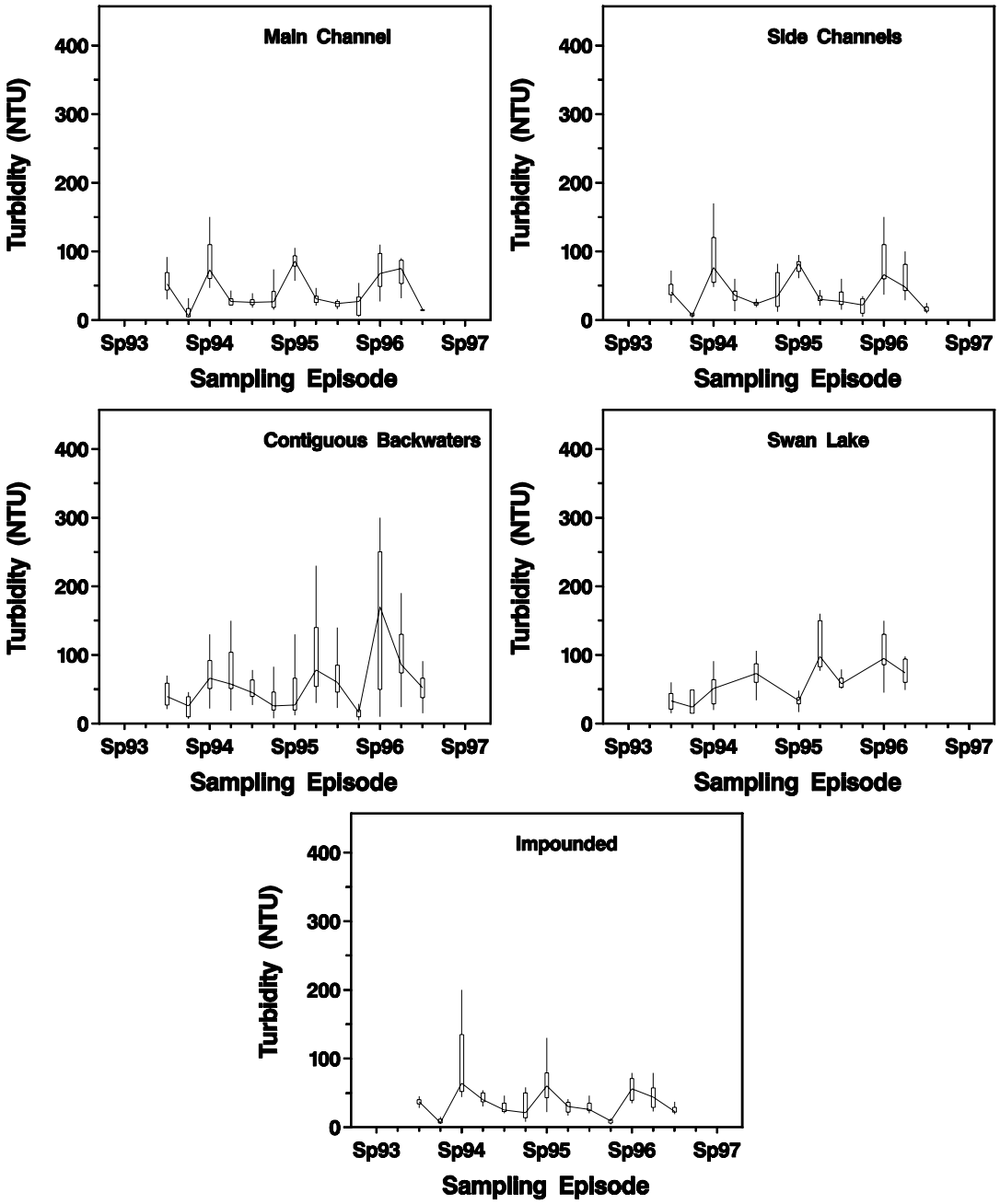

Figure F-6. Turbidity (NTU) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

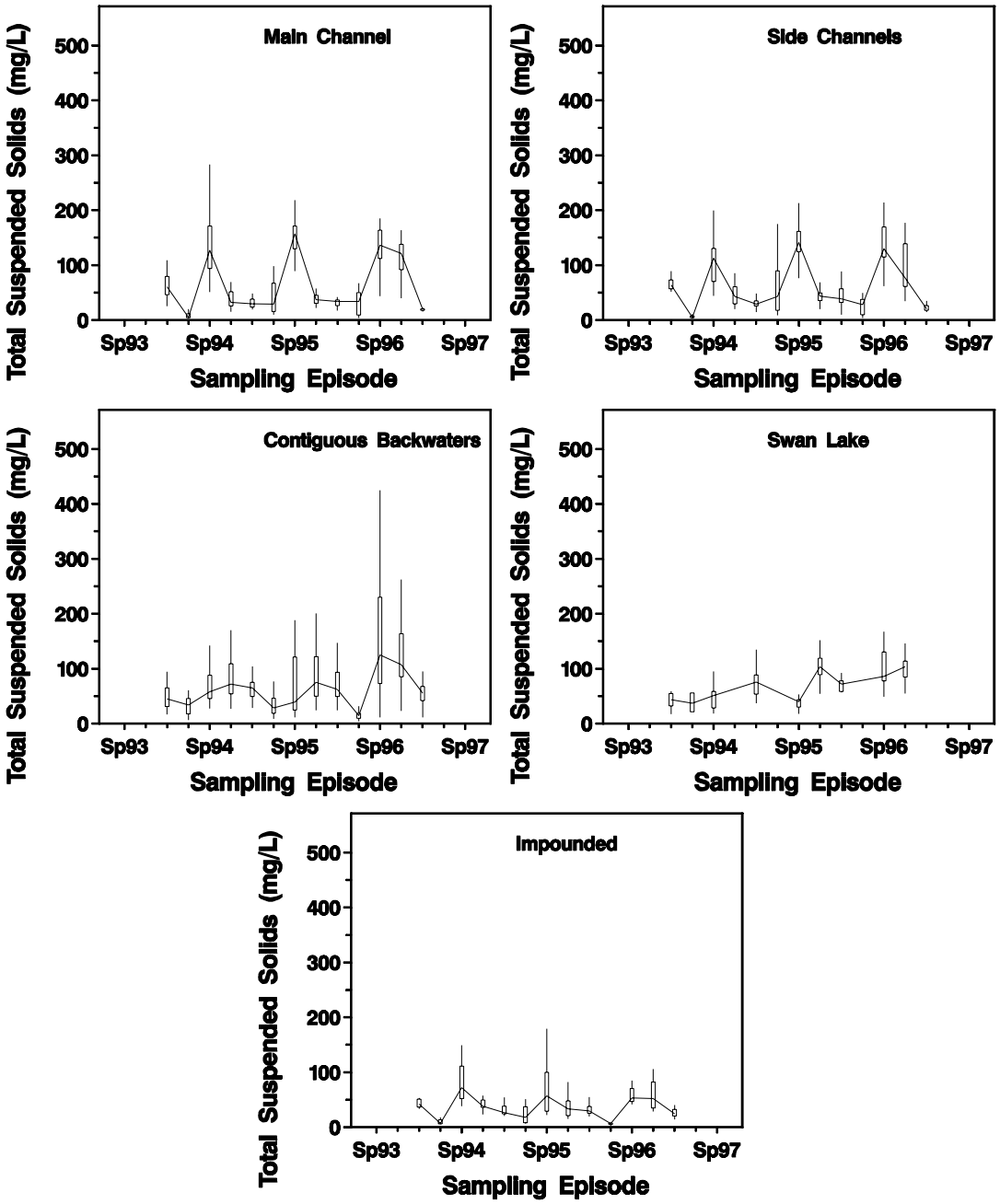

Figure F-7. Total suspended solids (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

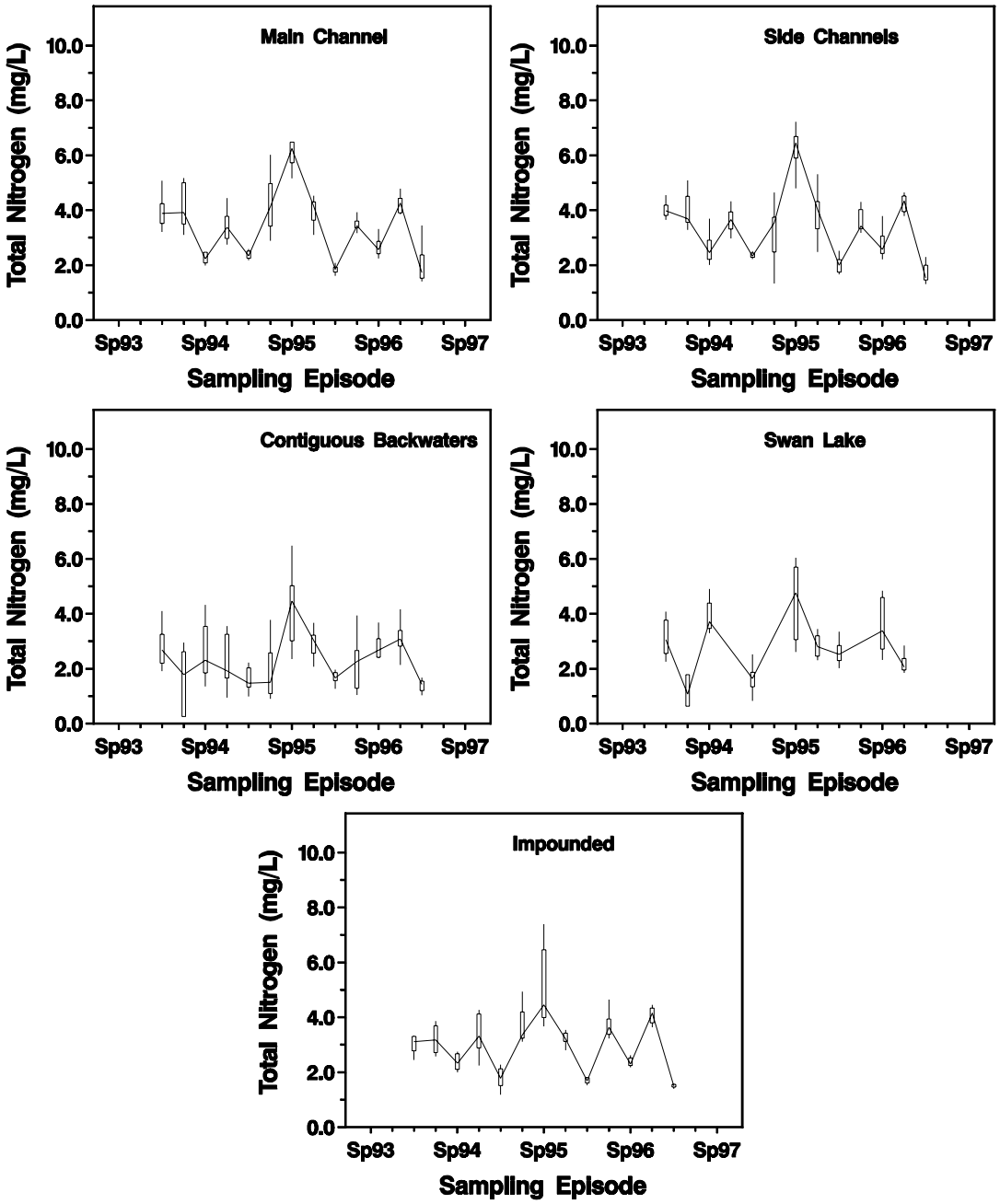

Figure F-8. Total nitrogen (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

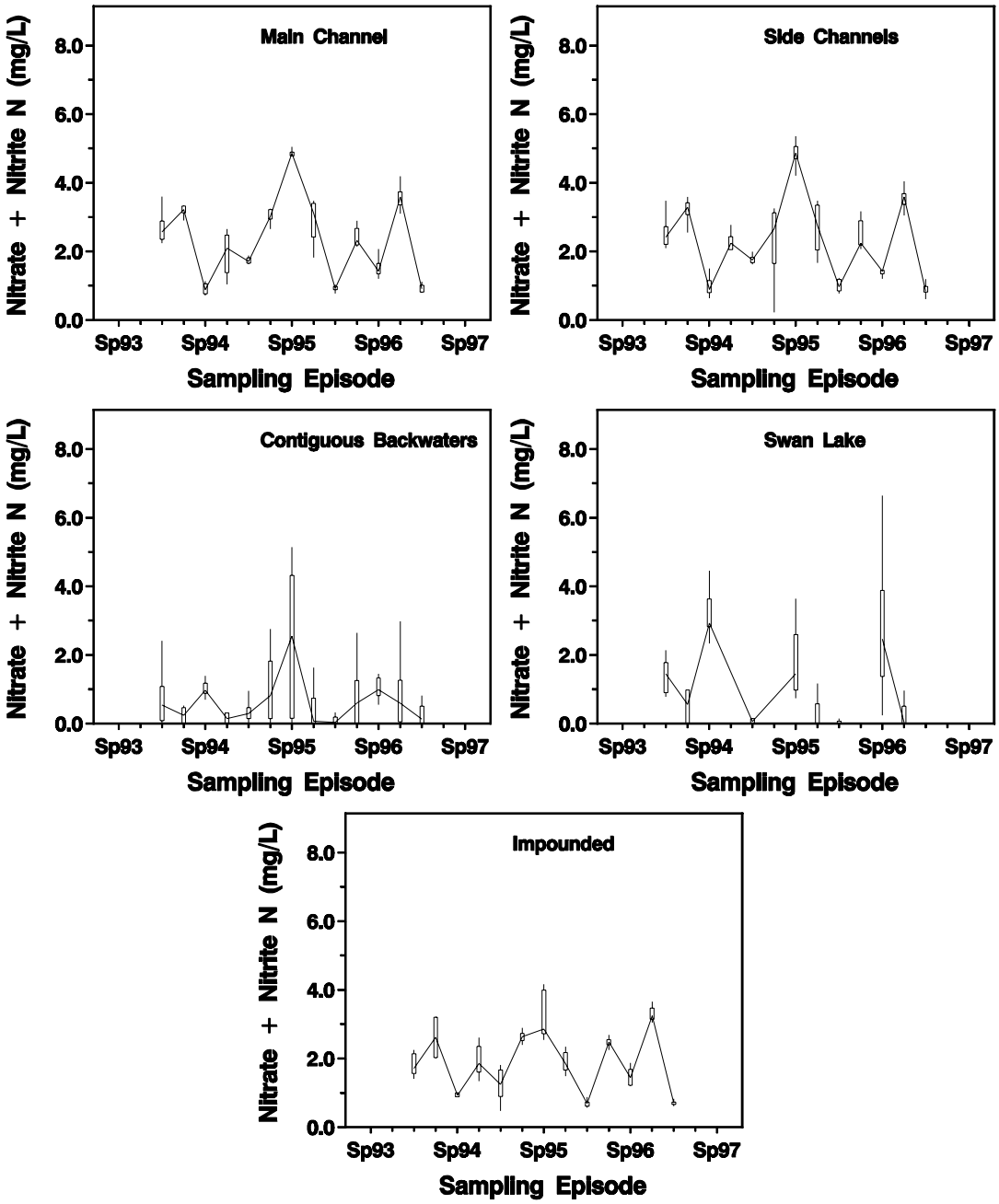

Figure F-9. Nitrate–nitrite nitrogen (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

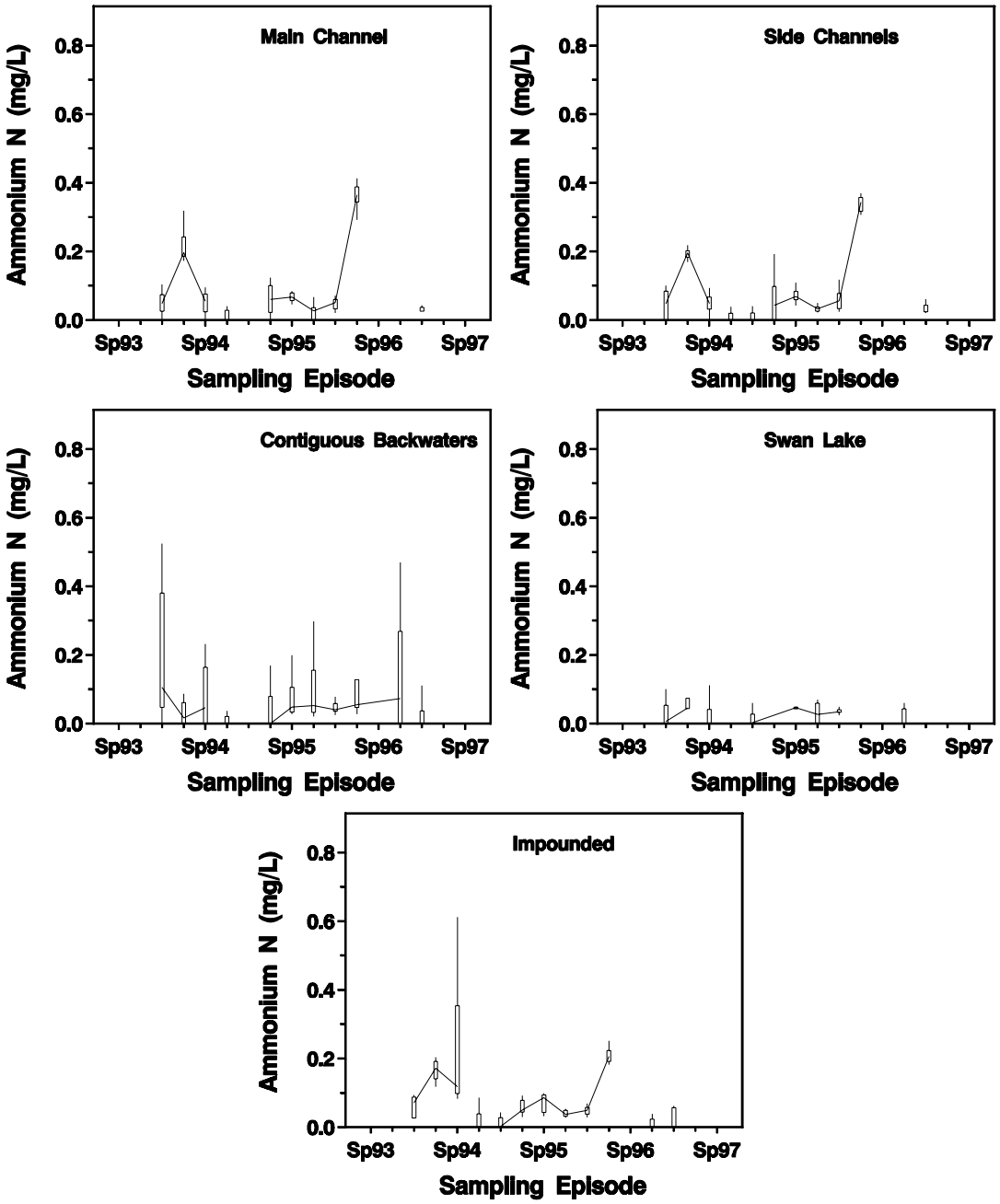

Figure F-10. Ammonium nitrogen (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

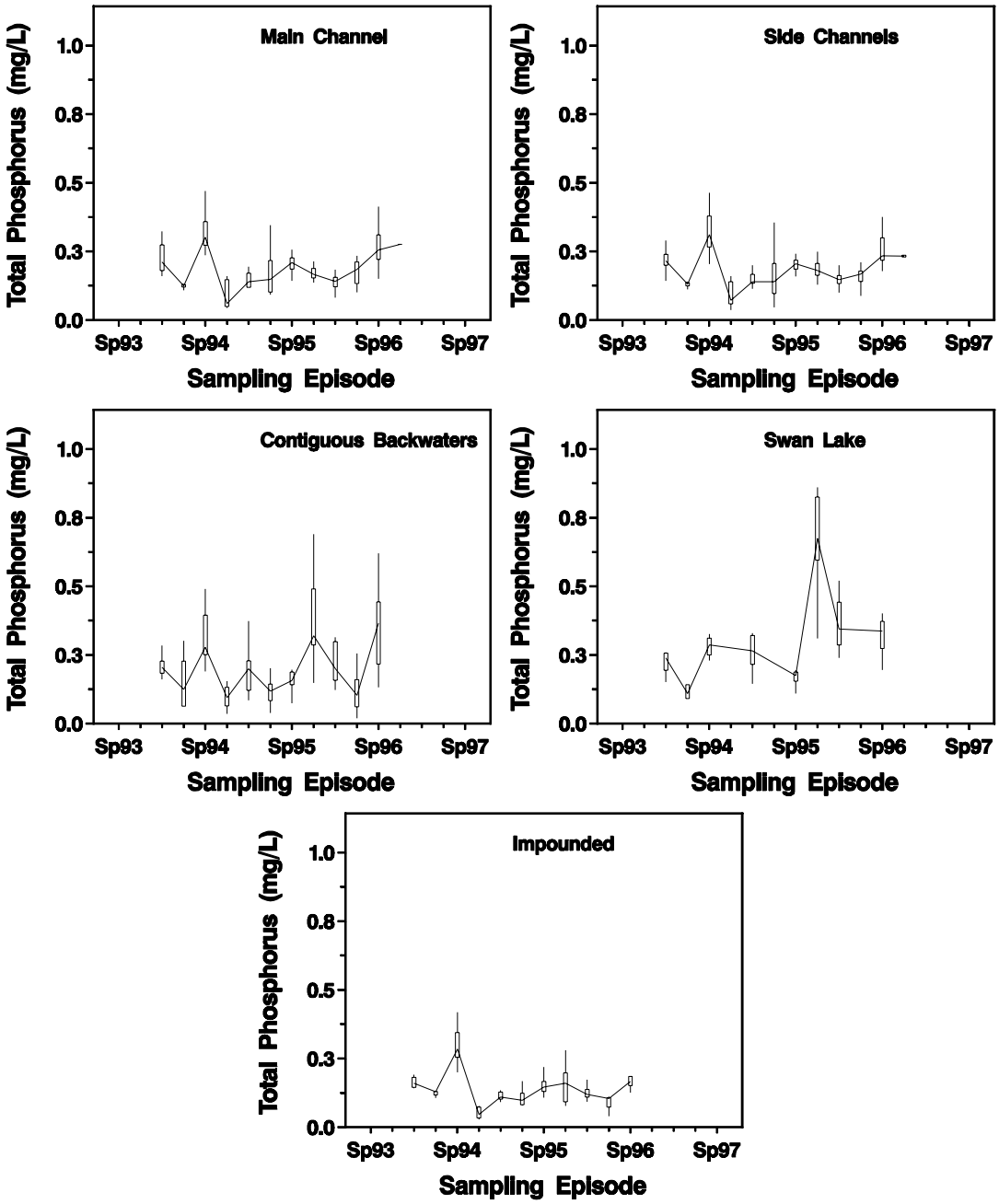

Figure F-11. Total phosphorus (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

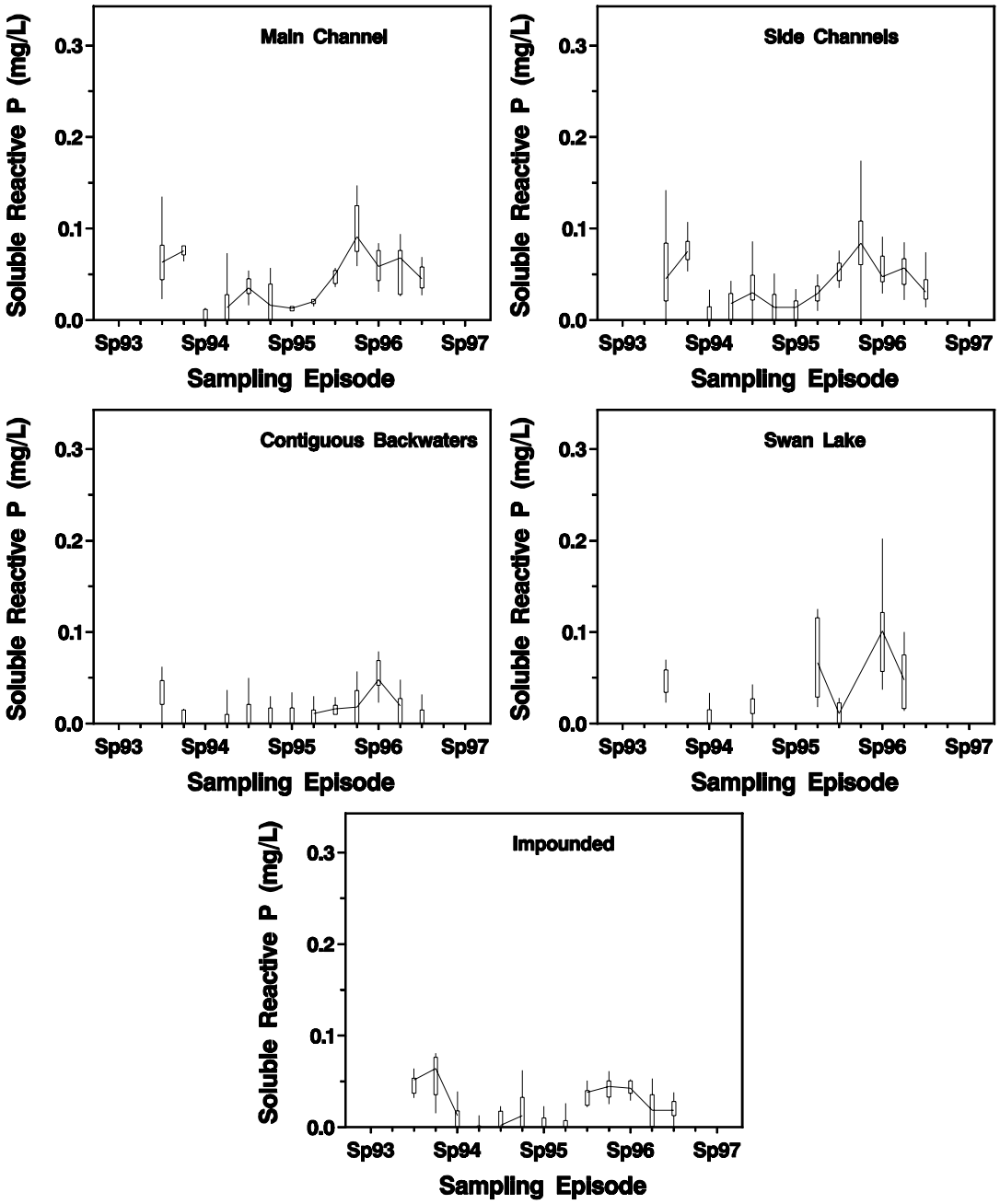

Figure F-12. Soluble reactive phosphorus (mg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

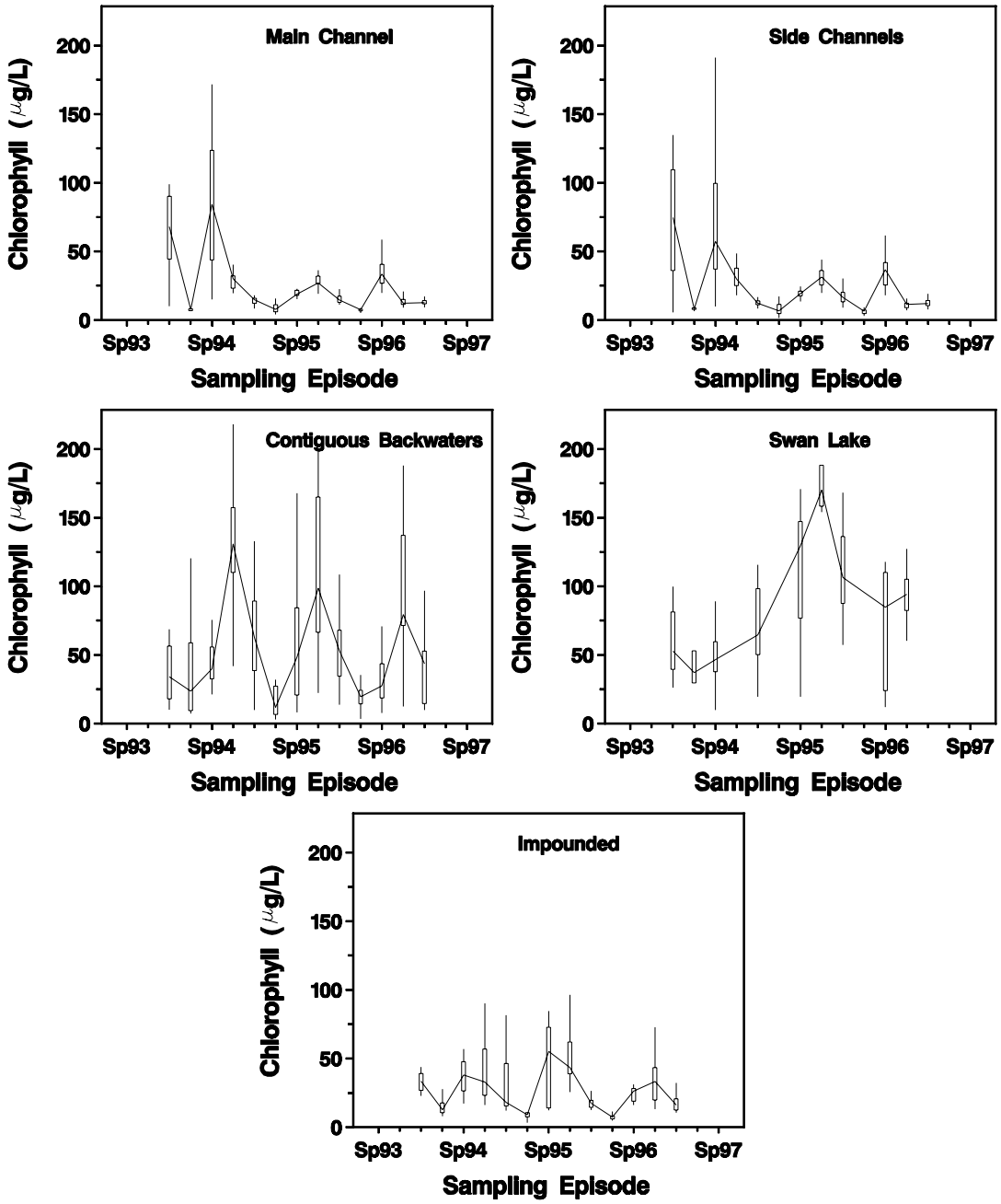

Figure F-13. Fluorometric chlorophyll *a* (µg/L) in stratified random sampling episodes from spring 1993 (Sp93) through fall 1996. Each sampling stratum is plotted separately. A solid line connects the medians of each episode, the 90th and 10th percentiles of the data are shown by the upper and lower extent of the box, and vertical lines extend to the maximum and minimum values (or to the limits of the plotting axis).

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13. ABSTRACT (Maximum 200 words) Since 1988, the Long Term Resource Monitoring Program (LTRMP) staff have performed basic limnological field measurements in the Upper Mississippi River System. The period of this report (1993–96) includes a major revision of the LTRMP sampling design in 1993 that added randomization, broader spatial coverage, and increased monitoring of tributaries and locations that allow monitoring of material transport. The 1993–96 water quality data for the Pool 26 area show long-term declines in the concentrations of total nitrogen, nitrate–nitrite nitrogen, and soluble reactive phosphorus after the large flood in 1993. The data also indicate that contiguous backwaters have unique water quality among the sampling strata, characterized by higher turbidity, volatile suspended solids, and fluorometric chlorophyll *a*, and lower total nitrogen and nitrate–nitrite nitrogen. The Missouri and Illinois Rivers significantly alter the Mississippi River main stem in the Pool 26 study area. The Missouri River contributes high turbidity, silicate silica, and total suspended solids, whereas the Illinois River contributes elevated concentrations of total nitrogen, nitrate, total phosphorus, and soluble reactive phosphorus. Dissolved oxygen concentrations (>5 mg/L) were good in the Mississippi River main stem but were somewhat lower in the Missouri and Illinois Rivers. In the Illinois River, concentrations fell to or below the Illinois general use water quality standard of 5 mg/L every summer during 1993–96.			
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The Long Term Resource Monitoring Program (LTRMP) for the Upper Mississippi River System was authorized under the Water Resources Development Act of 1986 as an element of the Environmental Management Program. The mission of the LTRMP is to provide river managers with information for maintaining the Upper Mississippi River System as a sustainable large river ecosystem given its multiple-use character. The LTRMP is a cooperative effort by the U.S. Geological Survey, the U.S. Army Corps of Engineers, and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin.